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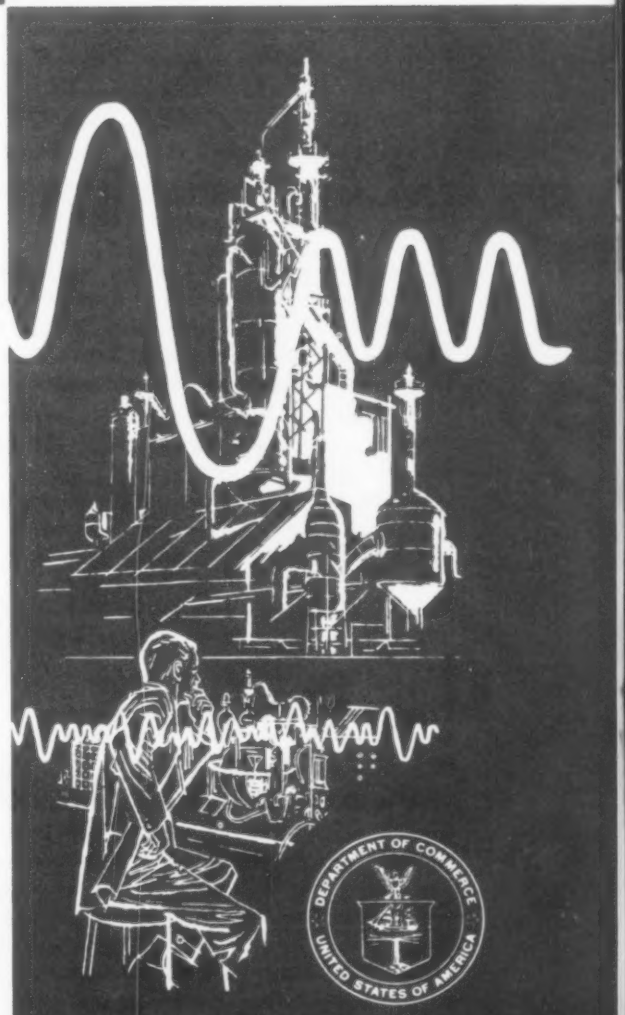

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Luther H. Hodges, *Secretary*

OFFICE OF TECHNICAL SERVICES
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AQUEOUS STANNOUS FLUORIDE SOLUTIONS WERE ADDED TO SILEX, AND THE ABILITY OF THE RESULTING PROPHYLAXIS PASTES TO PREVENT IN VITRO ENAMEL DECALCIFICATION WAS TESTED.
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MATRIX METHODS APPLIED TO THE GIBBSIAN VECTORS AND DYADICS WITH APPLICATIONS TO FLIGHT DYNAMICS.
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AN IDENTITY CONCERNING THE RELATION BETWEEN THE PAASCHE AND LASPEYRE INDICES.
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*VEHICLES

FIRST INTERNATIONAL CONFERENCE ON THE MECHANICS OF SOIL-VEHICLE SYSTEMS.
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*VEHICLES
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AN ELECTRONIC PREDICTOR INSTRUMENT.
AD-288 963 DIV. 8

*VEHICLES
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NORDELL CARRIER RN 110. PHASE III TROPICAL EVALUATION.
AD-288 792 DIV. 33

*VENUS
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*VERTICAL TAKE-OFF PLANES
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AD-289 561 DIV. 9

*VIBRATION

THE COMPUTED FREQUENCY AND ANGULAR DISTRIBUTION OF THE NORMAL MODES OF VIBRATION IN RECTANGULAR ROOMS.
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THE VIBRATIONS OF A WHIRLING RAYLEIGH BEAM.
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*VIBRATION
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PRODUCTION OF SYMPTOMS IN SPECIFIC BODY REGIONS TO WHOLE-BODY VIBRATIONS IS DEPENDENT UPON PHYSIOLOGICAL ALTERATIONS RESULTING FROM THE MECHANICAL STIMULATION OF VARIOUS ORGAN-TISSUE COMPLEXES OF THE BODY. MECHANICAL AND PHYSIOLOGICAL RESPONSES WERE CORRELATED FROM TESTS OF FIFTEEN SUBJECTS WHO EXPERIENCED WHOLE-BODY VIBRATIONS. QUALITATIVE AND QUANTITATIVE SUBJECTIVE RESPONSE TO LONGITUDINAL VIBRATIONS FROM 1 TO 20 CPS IN A SITTING POSITION.
AD-288 877 DIV. 16

*VIBRATION ISOLATORS
FIBERBOARD

IMPACT - REDUCTION METHOD FOR SIDE-LAUNCHING PONTOON STRUCTURES. USE OF FIBREBOARD CUSHIONS.
AD-288 281 DIV. 31

VIBRATION ISOLATORS
FLOATS

IMPACT - REDUCTION METHOD FOR SIDE-LAUNCHING PONTOON STRUCTURES. USE OF FIBREBOARD CUSHIONS.
AD-288 281 DIV. 31

VIBRATION MECHANISMS

THE COMPUTED FREQUENCY AND ANGULAR DISTRIBUTION OF THE NORMAL MODES OF VIBRATION IN RECTANGULAR ROOMS.
AD-288 240 DIV. 25

VIBRATION MECHANISMS
MAN

A VERTICAL ACCELERATOR FOR SIMULATION OF VIBRATION AND BUFFETING ENCOUNTERED IN AEROSPACE OPERATIONS. DESIGN, MOTION CAPABILITIES, CONTROLS AND SAFETY FEATURES. PERIODIC OR RANDOM ACCELERATION PATTERNS. PEAK TO PEAK AMPLITUDES OF PLUS OR MINUS 5 FT FROM 0.5 TO 10 CPS. MAXIMUM ACCELERATION FROM 2.5 TO 3 G.
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WATER ACTIVATED BATTERIES

BATTERY, WATER ACTIVATED BA-( )/U (DEVELOPMENT MODEL).
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SPECTROGRAPHIC ANALYSIS

MEASUREMENT OF ATMOSPHERIC WATER VAPOR BY A SPECTROPHOTOMETRIC TECHNIQUE.
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AD-289 534 DIV. 2

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AD-288 704 DIV. 26

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PROGRESS IS REPORTED ON ELECTRON BEAM WELDING TECHNIQUES. MOST PROMISING RESULTS WERE OBTAINED USING MACHINE SETTINGS AT 100 KV, 3 MA, AND A SPEED OF 60 IPM TO PRODUCE A WELD GEOMETRY 1/3 OF THE MATERIAL THICKNESS.
AD-288 766 DIV. 26

WELDS

PROGRESS IS REPORTED ON ELECTRON BEAM WELDING TECHNIQUES. MOST PROMISING RESULTS WERE OBTAINED USING MACHINE SETTINGS AT 100 KV, 3 MA, AND A SPEED OF 60 IPM TO PRODUCE A WELD GEOMETRY 1/3 OF THE MATERIAL THICKNESS.
AD-288 766 DIV. 26

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DEMONSTRATING THE FEASIBILITY OF MINIATURIZING THE LIQUID AMMONIA ACTIVATED BATTERY.
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IMPROVEMENT OF CERTAIN OPERATIONAL CHARACTERISTICS OF SILVER-ZINC STORAGE BATTERIES.
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BATTERY, WATER ACTIVATED BA-( )/U (DEVELOPMENT MODEL).
AD-288 794 DIV. 7

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SOME ERRORS ASSOCIATED WITH ACOUSTICAL WIND MEASUREMENTS THROUGH A LAYER. AN ACOUSTICAL WIND MEASURING ARRAY IS DISCUSSED.
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AD-288 147 DIV. 2

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AD-288 161 DIV. 1

WINDSHIELDS
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FUSELAGE - 4FT8270 TEST SPECIMENS - UNPRIMED AND UNPIGMENTED - BURST STRENGTHS AT -65 F TO 260 F - EVALUATION OF.
AD-288 187 DIV. 1

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PRESSURE DISTRIBUTION ON SWEPT WINGS AT SUPERSONIC VELOCITIES.
AD-288 159 DIV. 9

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FABRICATION OF WIRE FROM ZONE-REFINED BERYLLIUM SINGLE CRYSTALS.
AD-288 904 DIV. 17

PHASE STUDIES AND BONDING TECHNIQUES FOR WIRE SYSTEMS AND BINARY ALLOYS. SMALL BALL, CAPILLARY AND ULTRASONIC BONDING INCLUDED.
AD-289 537 DIV. 26

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THE EFFECTS OF MARINE ORGANISMS ON ENGINEERING MATERIALS. AN ANALYSIS OF ENVIRONMENTAL VARIABLES IS SUMMARIZED.
AD-287 952 DIV. 2

CHEMICAL PULPING AND WALLBOARD EXPERIMENTS: FEASIBILITY OF MAKING MEDIUM-DENSITY AND INSULATION BOARDS FROM STEAM-COOKED PULPS BY PRESS-DRYING. STRENGTH PROPERTIES OF HARDBOARDS.
AD-288 033 DIV. 14

TIRE-TUBE METHOD OF FENCE POST TREATMENT.
AD-288 755 DIV. 14

YIELD IN CLEAR CUTTINGS FROM STANDARD GRADE EASTERN WHITE PINE BOARDS IN NEW ENGLAND.
AD-288 757 DIV. 14

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AD-288 758 DIV. 14

WOOD PULP

CHEMICAL PULPING AND WALLBOARD EXPERIMENTS: FEASIBILITY OF MAKING MEDIUM-DENSITY AND INSULATION BOARDS FROM STEAM-COOKED PULPS BY PRESS-DRYING. STRENGTH PROPERTIES OF HARDBOARDS.
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DEVELOPMENT OF AN IMPROVED DIFFUSION BOARD MATERIAL.
AD-288 761 DIV. 14

WORK FUNCTIONS

EFFECT OF SCHOTTKY EMISSION ON THERMIONIC CONVERTER CURRENTS IN IGNITED MODE.
AD-288 092 DIV. 8

X-RAY DIFFRACTION ANALYSIS

APPLICATION OF X-RAY DIFFRACTION TO OCEANIC SOIL ANALYSIS.
AD-288 536 DIV. 2

X RAYS
INTENSITY

A DISCUSSION BY SOVIET SCIENTISTS AT THE LEBEDEV PHYSICAL INSTITUTE ON SOLAR X-RAY EMISSION. THEORETICAL CALCULATION OF THE SOLAR X-RAY FLUX AND ITS SPECTRAL DISTRIBUTION WAS PERFORMED ON A DIGITAL COMPUTER. FLUXES ARE LISTED IN TABLE FORM.
AD-288 265 DIV. 20

XINC ELECTRODES

IMPROVEMENT OF CERTAIN OPERATIONAL CHARACTERISTICS OF SILVER-ZINC STORAGE BATTERIES.
AD-288 701 DIV. 7

ZODIACAL LIGHT

A BRIEF SUMMARY OF ATMOSPHERIC PHYSICS RESEARCH BY THE UNIVERSITY OF MINNESOTA SCHOOL OF PHYSICS FROM JANUARY TO SEPTEMBER 1962.
AD-287 909 DIV. 2

TECHNICAL ABSTRACT BULLETIN

1. AIRCRAFT AND FLIGHT EQUIPMENT

AD-287 937 Div. 1
(TISTA/SEB) OTS price $8.10

Douglas Aircraft Co., Inc., Long Beach, Calif.
ARMY-NAVY INSTRUMENTATION PROGRAM HISTORICAL REPORT.
Sep 62, 89p. incl. illus. 23 refs. (Rept. no. 40c41A)
Unclassified report

DESCRIPTORS: *Display systems, *Flight instruments, Instrument panels, Human engineering, Naval aviation, Naval aircraft, All weather aviation, Military aircraft, Naval research, Military research, Jet fighters, Attack bombers, Data processing systems, Research program administration.

Work was primarily directed towards arranging, aligning and combining existing instruments in arrays to provide a more readable and understandable display. The present program was directed toward the goal of achieving a true all-weather flight capability in Navy aircraft. True all-weather capability would mean taking off from some point, performing a mission en route, proceeding to some other point, and landing at that point without the necessity of seeing the ground. Improving pilot performance by simplifying the operation of aircraft data sensing, processing, and display as well as control capability was investigated. The history, philosophy, and design concepts are presented. (Author)

AD-288 155 Div. 1
(TISTA/GEC) OTS price $1.10

Stencel Aero Engineering Corp., Asheville, N. C.
RCD-MS SYSTEMS ROCKET CUSHIONING DEVICE APPLIED TO MODULAR SEAT.
Monthly progress rept. no. 2, 3 May-2 June 62.
6 June 62, 4p.
(Contract NOw 62-0561)
Unclassified report

DESCRIPTORS: *Ejection seats, Glass textiles, Rocket motor nozzles, Design, Aircraft seats, Shock, Absorption, Insulating materials, Costs.

AD-288 161 Div. 1
(TISTA/GEC) OTS price $1.60

General Dynamics/Fort Worth, Tex.
FUSELAGE TEST TO COMPARE VENDOR AND CONVAIR LAMINATING CYCLES AND TO COMPARE PRESSURE, TEMPERATURE, TIME AND TYPE OF PRIME FOR MAXIMUM SHEAR ON B-58 GLAZINGS.
Rept. for 4 May 59-2 Feb 60,
by J. L. Perry. 4 Mar 60, 10p. (Rept. no. FGT-2528)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Windshields, Fracture (Mechanics), Shear stresses, Jet bombers, Tests, Aging, Mechanical properties, Laminated glass.

AD-288 173 Div. 1
(TISTA/GEC) OTS price $1.10

Federal Aviation Agency, Washington, D. C.
ECONOMIC ASPECTS OF THE SUPERSONIC TRANSPORT.
June 62, 7p. (Bibliographic list no. 5)
Unclassified report

DESCRIPTORS: *Transport planes, *Bibliography, Jet planes, Costs, Economics, Design, Supersonic planes, Supersonics.

AD-288 179 Div. 1
(TISTA/GEC) OTS price $1.10

Stencel Aero Engineering Corp., Asheville, N. C.
APPLICATION OF MODULAR RESTRAINT, RECOVERY AND SURVIVAL SYSTEM (MS) TO SPECIFIC EJECTION SEATS.
Monthly progress rept. no. 1 for May 62.
6 June 62, 4p.
(Contract NOw 62-0587)
Unclassified report

DESCRIPTORS: *Ejection seats, Aircraft seats, Jet bombers, Attack bombers, Naval aircraft, Glass textiles, Design, Costs.

AD-288 180 Div. 1
(TISTA/GEC) OTS price $1.10

Stencel Aero Engineering Corp., Asheville, N. C.
RCD-MS SYSTEMS ROCKET CUSHIONING DEVICE APPLIED TO MODULAR SEAT.
Monthly progress rept. no. 1, 3 Apr-2 May 62.
8 May 62, 5p.
(Contract NOw 62-0561)
Unclassified report

DESCRIPTORS: *Ejection seats, Design, Aircraft seats, Glass textiles, Laminates, Rocket motors.

AD-288 183 Div. 1
(TISTA/GEC) OTS price $1.60

Beech Aircraft Corp., Wichita, Kans.
PROTOTYPE DEVELOPMENT MODEL 385 AIR REFUELING STORE.
Rept. for 1-30 June 62,
by C. V. Lassmann. 6 July 62, 9p. (Interim rept. no. 25; Engineering rept. no. 4452)
(Contract NOw 60-0060)
Unclassified report

DESCRIPTORS: *Airplane protuberances, *Towed bodies, *Aeronautical booms, Fuel systems, Refueling in flight, Thermal stresses, Tests, Naval aircraft, Jet fighters, Fuel hose.

AD-288 187 Div. 1
(TISTA/GEC) OTS price $1.60

General Dynamics/Fort Worth, Tex.
FUSELAGE - 4FTB270 TEST SPECIMENS - UNPRIMED AND UNPIGMENTED - BURST STRENGTHS AT -65 F TO 260 F - EVALUATION OF,
by J. L. Perry. 21 July 60, 10p. (Rept. no. FTDM-2691)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Windshields, Failure (Mechanics), Tensile properties, Temperature, Fuselages, Simulation, Rupture, Mechanical properties.

Division 1 - AIRCRAFT AND FLIGHT EQUIPMENT

AD-288 500 Div. 1, 15
(TISTP/TL) OTS price $6.60

Army Missile Test and Evaluation Directorate, White Sands Missile Range, N. Mex.
MATRIX METHODS APPLIED TO THE GIBBSION VECTORS AND DYADICS WITH APPLICATIONS TO FLIGHT DYNAMICS,
by James S. Pappas. Oct 62, 57p. incl. illus. table, 30 refs. (Special rept. no. 64)
Unclassified report

DESCRIPTORS: *Flight, *Matrix algebra, *Vector analysis, Mapping, Transformation (Mathematics), Equations, Dynamics.

Matrix methods applied to the vector, dyadic, and polyadic analysis of Gibbs simplifies the transformations encountered in deriving mathematical models of dynamical systems in moving bases. The matrix methods eliminate the need for mentally tracking hordes of tedious indices. The techniques are applied to the derivation of equations of motion of flight systems in ortho-normal as well as non-ortho-normal moving bases. (Author)

AD-288 502 Div. 1
(TISTA/SEB) OTS price $1.60

Hughes Tool Co., Culver City, Calif.
HOT CYCLE ROTOR SYSTEM THERMAL ANALYSIS, PART II,
by J. W. Rabek. Mar 62, 13p. incl. illus. 4 refs. (Rept. no. 285-11 (62-11), Suppl. to HTC-AD rept. no. 295-10, AD-251 353)
(Contract AF 33(600)30271)
Unclassified report

DESCRIPTORS: *Jet helicopter rotors, *Helicopter blades, Temperature, Thermal stresses, Aluminum, Heat transfer, Thermal radiation, Shielding, Analysis.

A survey is given of estimated temperatures in the blade root and hub section of the initial hot cycle rotor. Initial thermal analysis indicated a necessity of applying insulation to prevent high temperatures in this area. Aluminum clad shields were subsequently installed over the hot gas ducting. Due to the conservative approach used in the calculations, the highest predicted component temperatures remain much below acceptable limits. No thermal problems are anticipated in this area of the rotor. (Author)

AD-288 505 Div. 1, 27
(TISTA/SEB) OTS price $2.60

Hughes Tool Co., Culver City, Calif.
HOT CYCLE ROTOR SYSTEM ROTOR DYNAMICS,
by S. V. LaForge. Mar 62, 24p. incl. illus. table, 2 refs. (Rept. no. 285-14 (62-14)
(Contract AF 33(600)30271)
Unclassified report

DESCRIPTORS: *Jet helicopter rotors, Helicopters, Convertible airplanes, Pressure, Elasticity, Vibration, Frequency, Theory, Operation, Mathematical analysis, Feasibility studies, Resonance, Helicopter blades, Excitation.

The predicted blade elastic resonant conditions for the Hot Cycle whirl test rotor are given. The rotor should be free of resonance within the operating range. The apparent resonance of chordwise cantilever second mode with a 6/rev exciting force in the operating range of RPM is not expected to occur. This is because the exciting forces are assumed of aerodynamic origin and, in a 3-bladed rotor, 6/rev aerodynamic forces will excite chordwise pinned modes only. (Author)

AD-288 649 Div. 1, 12
(TISTA/SEB) OTS price $4.00

Lockheed Aircraft Corp., Marietta, Ga.
STOCHASTIC DISTURBANCE DATA FOR FLIGHT CONTROL SYSTEM ANALYSIS.
Final rept.,
by John E. Hart, Lowry A. Adkins, and Larry L. Lacau. Sep 62, 254p. incl. illus. tables, refs.
(Contract AF 33(616)8088, Proj. 8219)
(ASD TDR 62-347) Unclassified report

DESCRIPTORS: *Control systems, Flight, Turbulence, Winds, Shear stresses, Gust loads, Solar energy, Magnetic fields, Meteorites, Vibration, Acoustics, Satellite vehicles, Spaceships, Extraterrestrial bases, Airplanes, Booster rockets, Thrust, Aircraft.

Disturbance data, together with guidance signals, are needed to perform realistic analyses of flight control systems. Stochastic disturbances, which are by definition defined only in a statistical sense, have not previously been compiled and codified for use in such analyses. The stochastic data included in this report cover the subjects of winds, wind shear, gusts, magnetic fields, solar radiation, vibration and acoustics, meteors, thrust irregularities, and sensor noise. Areas of these subjects in which needed data are lacking have been exposed by the study. Present programs of data accumulation cited and the recommended new programs will produce significant information required to supplement the data of this report. A table of earth magnetic field intensities is included as an appendix. (Author)

AD-288 662 Div. 1
(TISTB/LMH) OTS price $1.00

Clark, David, Co., Inc., Worcester, Mass.
INTEGRATION OF PERSONAL EQUIPMENT.
Final rept., Apr 61-June 62,
by A. J. Kenneway, III. Sep 62, 30p. incl. illus.
(Contract AF 33(616)8250, Proj. 6336)
(ASD TDR 62-601) Unclassified report

DESCRIPTORS: *Pneumatic life rafts, *Sea rescue equipment, *Life preservers, Design, Production, Nylon, Military requirements, Air Force equipment, Bailout, Survival.

Due to the extremely variable environments to which U. S. Air Force personnel are subjected, survival equipment reliability is becoming an urgent critical requirement. Work continues in design and fabrication of items which will fulfill the requirements, are lightweight, capable of being integrated with other flight equipment, and easily operable by one man. This report describes the approach methods, problem areas and progress made in fabricating a one-man cold water survival raft, several underarm life preservers with and without parachute harness integration, and re-design approaches to the standard one-man life raft (PK-2 and MB-4). These items would provide an aircrew member with survival capabilities if he were subjected to bailout over water. The main problems of designing and integrating these items with others without compromising individual specifications are discussed. Practical solutions were achieved in most areas. (Author)

AD-288 764 Div. 1
(TISTM/EJH) OTS price $1.10

Naval Air Test Center, Patuxent River, Md.
CARRIER SUITABILITY EVALUATION OF THE MK 12

MOD O AIRCRAFT CHEMICAL TANK INSTALLED ON FJ-4B/A4D AIRPLANES.
Interim rept. no. 1,
by J. D. Yamnicky and J. L. Shipley. 27 June 62, 4p. (Proj. RSSH 44-42; Serial no. FT2221-202)
Unclassified report

DESCRIPTORS: *Aircraft chemical tanks, Catapults, Launching, Landing, Jet fighters, Tests, Reliability, Smoke screens.

AD-288 786 Div. 1
(TISTW/PCR) OTS price $2.60

Air Crew Equipment Lab., Naval Air Material Center, Philadelphia, Pa.
HUMAN ENGINEERING INVESTIGATIONS OF AIRCRAFT COCKPIT VISUAL DISPLAYS. INVESTIGATIONS INTO FACTORS AFFECTING CONTROL ACTIVATION. III. ROTARY SWITCHES; NUMBER AND ACTIVATION SEQUENCE,
by Arthur I. Siegel, Douglas G. Schultz, and Richard S. Lanterman. 11 June 62, 21p. (Rept. no. NAMC-ACEL-479; Proj. no. TED NAM AV-43001, pt. 4)
(Contract N156-40376)
Unclassified report

DESCRIPTORS: *Cockpits, *Rotary switches, Human engineering, Toggle switches, Display systems.

AD-288 852 Div. 1, 14
(TISTM/ODN) OTS price $1.10

General Dynamics/Fort Worth, Tex.
FUSELAGE - GLASS - ATMOSPHERIC EXPOSURE - DEGRADATION EFFECTS TEST,
by E. L. Trussell. 1 Feb 60, 6p. incl. illus. tables (Rept. no. FTDM-2455)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Windshields, Exposure, Airplanes, Adhesion, Deterioration, Tests, Weatherproofing, Glass, Atmosphere, Fuselages.

The effect of extended atmospheric exposure on the adhesive qualities of B-58 windshield interlayer was determined. Testing was conducted at room temperature in a Baldwin tensile test machine with a Tate-Emery load indicator. Load application rate was 1000 pounds per minute. (Author)

AD-288 855 Div. 1, 14
(TISTM/BRW) OTS price $1.10

General Dynamics/Fort Worth, Tex.
MATERIAL - WINDSHIELD - INTERLAYER - SILICONE RUBBER - EVALUATION OF VACUUM POST CURE TO IMPROVE WEATHERING RESISTANCE,
by W. T. Carroll. 22 Aug 62, 9p. incl. illus. tables (Rept. no. FTDM-3035)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Windshields, Laminates, Silicones, Glass, Synthetic rubber, Airplanes.

Pigmenting the Type K silicone interlayer with CaCO3 around the edges of B-58 windshields has not produced the extended service life which laboratory tests indicated. Tests were made to determine if extended service life could be expected from production B-58 windshields which had been post cured under vacuum and to analyze the volatiles released during this post cure. Three 4B1132 pilot enclosure windshields were tested. Two of these were vacuum post cured and all three exposed to sunlight, SO2 and moisture. The time-to-first-crack on exposure for the windshields which received a vacuum post cure was approximately 7-1/2 hours more than that for the windshield which did not receive a vacuum cure. Based on the data obtained, vacuum post curing of B-58 windshields will improve their weathering resistance. (Author)

AD-288 871 Div. 1
(TISTA/SEB) OTS price $1.60

California U., Berkeley.
FOG CHAMBER LIGHTING TEST.
Interim memorandum rept.,
by L. C. Vipond. Nov 62, 13p. incl. illus.
(Contract ARDS-434, Proj. 421-17D)
Unclassified report

DESCRIPTORS: *Fog, *Runway lights, Landing fields, Tests, Effectiveness, All-weather aviation, Airplane landings, Test facilities.

The design and effectiveness of a fog chamber is reported. More effective means of lighting runways under low visibility are being studied.

AD-288 890 Div. 1
(TISTA/GEC) OTS price $1.10

Sperry Gyroscope Co., Great Neck, N. Y.
ADAPTIVE RELIABILITY TECHNIQUES.
Quarterly progress rept. no. 2, 1 July-30 Sep 61,
by E. R. Tribken. Oct 61, 6p. (Rept. no. LJ-1262-0121)
(Contract NOw 61-0393d)
Unclassified report

DESCRIPTORS: *Control systems, *Automatic pilots, Reliability, Hypervelocity vehicles, Stability, Design, Feedback, Servo systems, Computers, Automatic.

A system layout for a stability augmentation system incorporating the principles of adaptive reliability has been started. The significant problem areas studied are: sensors, transducers, transfer function networks, adaptive computers, servo amplifiers and actuators, and feedback techniques. (Author)

AD-288 891 Div. 1
(TISTA/GEC) OTS price $1.60

Sperry Gyroscope Co., Great Neck, N. Y.
ADAPTIVE RELIABILITY TECHNIQUES.
Quarterly progress rept. no. 3, 1 Oct-31 Dec 61,
by E. R. Tribken. Jan 62, 11p. incl. illus.
(Rept. no. LJ-1262-0136)
(Contract NOw 61-0393d)
Unclassified report

DESCRIPTORS: *Control systems, *Automatic pilots, Reliability, Hypervelocity vehicles, Stability, Design, Feedback, Servo systems, Automatic.

Investigation continued on an adaptive-reliability stability augmentation system for aerospace vehicles. The study included: sensors - rate gyro, adaptive computers - adaptor, transfer function networks - washout, servo amplifier and actuator, and feedback techniques - output transducers. (Author)

AD-288 911 Div. 1
(TISTA/GEC) OTS price $2.60

Tactical Air Command, Langley Air Force Base, Va.
OPERATIONAL TEST AND EVALUATION THE A/A 37U-15

TOW TARGET SYSTEM.
Final rept.,
by Raymond L. Krasovich, Carl E. Taylor and others. Nov 62, 19p. incl. illus. (Rept. no. TAC TR 62-16)

Unclassified report

DESCRIPTORS: *Aerial targets, Jet fighters, Transonics, Flight testing, Launching, Effectiveness, Towing planes, Recovery, Ground support equipment, Airplane protuberances, Aerodynamics, Maintenance, Towed bodies.

The F-104 aircraft can safely tow the TDU-10B target with the A/A 37U-15 tow system. No modification to the aircraft is necessary and existing wiring is used to launch and recover the target. Maintenance of the system has posed no new or unusual problems. Superior aerodynamic characteristics of the system allow greater flexibility of dart towing than was previously possible. (Author)

AD-288 932 Div. 1
(TISTA/GEC) OTS price $1.10

Beech Aircraft Corp., Wichita, Kans.
PROTOTYPE DEVELOPMENT MODEL 385 AIR REFUELING STORE.
Interim rept. no. 29, 1-31 Oct 62,
by C. V. Lassmann. 9 Nov 62, 3p. (Engineering rept. no. 4556)
(Contract NOw 60-0060-c)

Unclassified report

DESCRIPTORS: *Aeronautical booms, *Refueling in flight, Airplane protuberances, Jet fighters, Fuel systems, Fuel hoses, Towed bodies, Research program administration.

Detail design of the Beech Model 385 Air Refueling Store for the value analysis configuration is near completion. A ground resonance test of the prototype store on the F4H airplane was completed; results indicate that the installation is suitable for flight. Preparations are in process for flight tests on the F4H. (Author)

AD-288 961 Div. 1, 12
(TISTW/RD) OTS price $2.60

Dunlap and Associates, Inc., Stamford, Conn.
SELF-ADJUSTING VEHICLE SIMULATORS,
by Charles R. Kelley. 1962, 21p.
(Contract Nonr-282200)

Unclassified report

DESCRIPTORS: *Control simulators, *Tracking, *Aircraft, *Satellite vehicles, Automatic, Human engineering, Training, Simulation, Control systems.

AD-288 962 Div. 1, 12
(TISTW/RD) OTS price $1.60

Dunlap and Associates, Inc., Stamford, Conn.
A PREDICTOR INSTRUMENT FOR MANUAL CONTROL,
by Charles R. Kelley. 1959, 19p.

Unclassified report

DESCRIPTORS: *Display systems, *Control, *Submarines, Human engineering, Automatic, Depth finding, Instrumentation, Control systems.

AD-288 988 Div. 1
(TISTW/PCR) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A DEVICE FOR AUTOMATIC ACTUATION OF A PARACHUTE RESCUE SYSTEM FOR USE DURING EJECTION,
by I. L. Amiragov, V. V. Ruzakov and others. 20 June 62, 6p. (Trans. no. FTD-TT-62-350 from Soviet Patent No. 132957 (655682/40), 22 Feb 60)

Unclassified report

DESCRIPTORS: *Parachutes, Automatic, Time interval counters, Pressure, Pistons, Springs, Diaphragms (Mechanics), Potentiometers, Electric motors, USSR, Release mechanisms.

AD-288 990 Div. 1
(TISTW/PCR) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
XX CENTURY-CENTURY OF SPEED - TU-124 MEDIUM RANGE JET PASSENGER AIRCRAFT,
by S. Yeger. 22 May 62, 13p. (Trans. no. FTD-TT-62-764 from Grazhdanskaya Aviatsiya, No. 4, pp. 10-13, 1962)

Unclassified report

DESCRIPTORS: *Commercial planes, Jet planes, Passenger vehicles, Jet engines, Turbofan engines, Turbojet engines, Aerodynamic configurations, USSR.

AD-289 369 Div. 1
(TISTA/GEC) OTS price $2.60

Air Force Proving Ground Command, Eglin Air Force Base, Fla.
COMPATIBILITY TEST OF THE A/A 37U-15 TOW SUBSYSTEM WITH THE F-100D AIRCRAFT,
by Robert J. Tracy. Nov 62, 19p. incl. illus. table. (Rept. no. APGC TDR 62-66)
(Proj. 7831W13)

Unclassified report

DESCRIPTORS: *Aerial targets, Jet fighters, Transonics, Flight testing, Tests, Launching, Effectiveness, Towing planes, Recovery, Ground support equipment, Airplane protuberances, Towed bodies.

A compatibility test was conducted of the A/A 37U-15 tow subsystem with the F-100D aircraft. This subsystem was designed to provide the Tactical Air Command with a transonic tow target capability for gunnery training for the F-104C, F-100C/D, F86H, and F-84F aircraft. Missions were conducted to test the tow subsystem for ground and airborne compatibility with the F-100D aircraft. The operation of the tow subsystem during launch and tow and performance capabilities while flying typical mission profiles were evaluated. The THU-4/E rewind stand was also evaluated for use as ground support equipment. (Author)

AD-289 425 Div. 1
(TISTP/WH) OTS price $2.60

Wisconsin U., Madison.
MAJOR VEGETATION TYPES OF WESTERN ONTARIO AND MANITOBA FROM AERIAL PHOTOGRAPHS,
by James A. Larsen. Feb 62, 26p. (Technical rept. no. 7)
(Contract Nonr-120207, Proj. NR 387-022)

Unclassified report

DESCRIPTORS: *Plants, *Terrain, *Aerial photography, Manitoba, Ontario.

AD-289 513 Div. 1
(TISTA/GEC) OTS price $1.60

System Development Corp., Santa Monica, Calif.
TERMINAL AIR TRAFFIC CONTROL. A LABORATORY

MODEL FOR MAN-MACHINE SYSTEM RESEARCH,
by L. T. Alexander and M. Ash. 5 Nov 62, 10p. incl. table (Rept. no. SP-1016)
Unclassified report

DESCRIPTORS: *Air traffic control systems, Scheduling, Simulation, Mathematical prediction, Test facilities, Interception probabilities, Aviation safety, Automatic, Communication systems, Tests.

A laboratory model of a Terminal Air Traffic Control System was designed to be used as a vehicle for research in man-machine systems. The initial configuration of this system was described together with measures which were developed to test its response characteristics. Plans for comparing the performance of the live system with and without an analytical scheduling and routing model were discussed. (Author)

2. ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-287 909 Div. 2
(TISTP/FR) OTS price $1.10

Minnesota U. School of Physics, Minneapolis.
ATMOSPHERIC PHYSICS PROGRAM.
Summary rept., Jan-Sep 62.
Sep 62, 6p. 7 refs.
(Contract Nonr-71022)
Unclassified report

DESCRIPTORS: *Zodiacal light, *Ozone, *Ions, Density, Measurement, Photographic analysis, Instrumentation.

Contents:
Balloon-borne zodiacal light cameras
Atmospheric ozone studies with the chemiluminescent ozone detector
Atmospheric ion density

AD-287 919 Div. 2, 25
(TISTP/LMH) OTS price $10.10

Texas A. and M. Coll., College Station.
RADAR AND SFERICS INVESTIGATIONS OF TEXAS THUNDERSTORMS.
Final rept.,
by George L. Huebner, Jr., Vance E. Moyer, and Tom E. Sanford. 30 May 62, 130p. incl. illus. tables, 45 refs. (Ref. no. 62-11F)
(Contract AF 19(604)2182)
(AFCRL 62-847) Unclassified report

DESCRIPTORS: *Atmospherics, *Radar, *Noise (Radio), Thunderclouds, Meteorology, Radar reflections, Texas, Radiofrequency spectrum analyzers, Radiofrequency, Weather forecasting, Storms, Electromagnetic fields.

Results are described of an investigation to explain the fundamental characteristics of radiofrequency noise due to sferics and to correlate those characteristics with meteorological variables in such a way as to provide reliable, short-response parameters for the diagnosis and prediction of severe weather. A frequency index based on stroke rate and the amplitude mode of four of the frequencies investigated in this research (viz., 10, 50, 100, and 150 kc) showed reasonably good linear agreement with equivalent radar reflectivity. Moreover, despite the grossness of the observational data, the results of this study of Texas thunderstorms by comparative radar and sferics observations suggest a correlation between the frequencies at the amplitude modes in sferics spectra and the updraft velocities. (Author)

AD-287 947 Div. 2
(TISTP/FR) OTS price $2.60

Uppsala U. (Sweden).
GEOPHYSICAL ASPECTS OF COSMIC RAYS.
Final rept.,
by Arne Eld Sandstrom. 31 Mar 62, 23p.
(Contract AF 61(514)1312)
(AFCRL 62-652) Unclassified report

DESCRIPTORS: *Cosmic rays.

AD-287 952 Div. 2
(TISTB/LMH) OTS price $1.00

Naval Civil Engineering Lab., Port Hueneme, Calif.
THE EFFECTS OF MARINE ORGANISMS ON ENGINEERING MATERIALS FOR DEEP-OCEAN USE,
by James S. Muraoka. 7 Mar 62, 38p. incl. illus. 77 refs. (Technical rept. no. R182)
(Proj. Y-R011-01-042)
Unclassified report

DESCRIPTORS: *Marine biology, *Sea water, *Wood, Materials, Damage control, Marine borers, Plastics, Metals, Cement, Concrete, Elastomers, Bacteria, Crustacea, Mollusca, Aquatic animals, Deterioration, Physical properties.

A literature survey was made of the effects of marine organisms on various types of engineering materials, particularly in deep-ocean environments. Numerous materials such as manila ropes, cotton fishing nets, petroleum hydrocarbons, rubber products, steel, submarine cables (telegraph and telephone), concrete, and cork (floats) have been attacked and destroyed by various marine organisms in various depths, from shallow protected waters to ocean depths exceeding 7,200 feet. Marine organisms which have been observed to be responsible for the destruction of these materials include species of wood- and rock-burrowing animals, purple sea urchins, sharks, fish, and microorganisms. (Author)

AD-287 953 Div. 2
(TISTP/FR) OTS price $15.00

Air Force Cambridge Research Labs., Bedford, Mass.
GEOPHYSICAL DATA FROM U. S. ARCTIC OCEAN DRIFT STATIONS 1957-1960,
by G. H. Cabaniss. July 62, 234p. incl. illus. tables, 89 refs. (Rept. no. AFCRL 62-683)
(Proj. 7628)
Unclassified report

DESCRIPTORS: *Oceanographical data, Ice islands, Oceans, Salinity, Phosphorous, Phosphorous compounds, Silicates, Nitrogen, Nitrogen compounds, Nitrates, Oxides, Chlorine, Silicon compounds, Terrestrial magnetism, Gravity, Measurement, Arctic regions.

Geophysical data taken from March 1957 to September 1960 at the three United States Arctic Ocean drifting stations, ALPHA, T-3 (BRAVO), and CHARLIE, are presented. The tabulations include station positions, ocean depths, oceanographic data, observed gravity and anomalies, and values of some of the magnetic elements. Field procedures are described. A bibliography of reports derived from the scientific programs during this period is included. (Author)

AD-287 971 Div. 2
(TISTP/FR) OTS price $1.60

Ghana U. (Africa).
THE ELONGATION OF IRREGULARITIES IN THE EQUATORIAL

Division 2 - ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

IONOSPHERE.
Technical note no. 3 on Equatorial Study of Irregularities in the Ionosphere,
by B. R. Clemesha. 20 July 62, 6p. illus. 6 refs.
(Contract AF 61(052)421)
(AFCRL 62-902) Unclassified report

DESCRIPTORS: *Ionosphere, Analysis, Radio waves, Medium frequency.

Results are given of a correlation analysis of spaced aerial fading measurements for medium frequency radio waves scattered from the D and E regions at a location near to the magnetic equator. These results show that there is a sharp increase in the elongation of the diffraction pattern on the ground, in the direction of the earth's magnetic field, for echoes from above 90 Km. Consideration of the relative rates of diffusion of irregularities parallel, and perpendicular, to the earth's magnetic field, shows that the height at which the ionosphere might be expected to become appreciably anisotropic with respect to the ambipolar motions of electrons and positive ions is in good agreement with the experimental results. (Author)

AD-287 989 Div. 2
(TISTB/MS) OTS price $2.60

Queen's U., Belfast (Gt. Brit.).
TEMPERATURE DETERMINATION FROM A CLOUD OF ALKALI VAPOUR IN THE UPPER ATMOSPHERE,
by G. T. Best and T. N. L. Patterson. 1962, 23p. incl. illus. table, 43 refs.
(Grant AF-EOARDC 61-16)
(AFCRL 62-1049) Unclassified report

DESCRIPTORS: *Upper atmosphere, *Temperature, *Clouds, *Sodium, *Lithium, Spectrographic analysis, Test methods, Measurement, Vapors, Determination.

A new method is discussed for measuring the temperature in an artificial cloud of alkali vapour. This method overcomes the complications introduced by the process of self-absorption. Estimates of the intensities of the relevant emission lines to be observed are made. It is concluded that observations made on lithium vapour present the best means of measurement. (Author)

AD-287 995 Div. 2
(TISTP/FR) OTS price $6.60

Davos Observatory (Switzerland).
COMPREHENSIVE CLIMATOLOGY OF COOLING POWER AS MEASURED WITH THE DAVOS FRIGORIMETER. PART I. GENERAL RESULTS OF THE CLIMATOLOGY OF COOLING POWER,
by E. Flach and W. Morikofer. Aug 62, 60p. illus. 67 refs. (Scientific rept. no. 1)
(Contract DA 91-591-EUC-976)
Unclassified report

DESCRIPTORS: *Climate, *Cooling, Measurement, Instrumentation, Statistical analysis, Spheres, Heating elements, Thermostats, Wattmeters.

A survey on the climatology of cooling power based on measurements and records with the Davos frigorimeter is given. A description of the various methods for the determination of cooling power and the different application for katathermometer, frigorimeter and frigorigraph is given. A survey on former investigations on cooling power and on the special problems of microclimatological differences and warm climates is mentioned. (Author)

AD-288 001 Div. 2
(TISTP/LMH) OTS price $1.60

Stanford Research Inst., Menlo Park, Calif.
OBJECTIVE AND DYNAMICAL STUDIES OF TROPICAL WEATHER PHENOMENA.
Quarterly progress rept. no. 1, 1 June-31 Aug 62,
by R. M. Endlich and R. L. Mancuso. 31 Aug 62, 26p. incl. illus. 5 refs.
(Contract DA 36-039-sc-89092, Proj. 3A99-27-025-09-00)
Unclassified report

DESCRIPTORS: *Weather forecasting, Marine meteorology, Meteorological data, Wind, Cyclones, Lapse rate, Caribbean Sea, Mathematical prediction, Statistical analysis, Tropical regions.

Subjective analyses of an upper-air cyclone over the Caribbean were carried out as a means of becoming familiar with data and analysis problems in this region. An extensive file of IBM card data for the Caribbean was obtained on loan from the University of Texas. Computer programs for determining layer-averaged values of meteorological quantities and for computing wind shear and lapse rate were applied to the case under study. Computer programs for calculating kinematical values of vorticity, divergence, vertical motion, etc. from Caribbean rawinsonde data and for mapping layer-averaged quantities were nearly completed. Hand computations were made of a streamfunction, which is intended to be an aid in tropical analysis and to be useful later in dynamical studies and in numerical forecasting. (Author)

AD-288 048 Div. 2
(TISTP/FR) OTS price $1.10

Aerospace Information Div., Washington, D. C.
GEOMAGNETIC ACTIVITY,
by V. M. Mishin and I. A. Zhulin. 25 Oct 62, 2p. (AID rept. no. 62-166, Trans. from Some Problems of Geomagnetic Activity. I. Geomagnetizm I Aeronomiya, 2:3, pp. 502-509, May-June 1962)
Unclassified report

DESCRIPTORS: *Terrestrial magnetism, Diurnal variations.

AD-288 049 Div. 2
(TISTP/FR) OTS price $1.10

Aerospace Information Div., Washington, D. C.
GEOMAGNETIC SECULAR VARIATIONS,
by V. I. Pochtarev. 23 Oct 62, 2p. (AID rept. no. 62-167, Trans. from Structure of the Field of Geomagnetic Secular Variations. Geomagnetizm I Aeronomiya, 2:3, pp. 523-526, May-June 1962)
Unclassified report

DESCRIPTORS: *Terrestrial magnetism.

AD-288 050 Div. 2
(TISTP/LMH) OTS price $1.10

Aerospace Information Div., Washington, D. C.
CLOUD MODIFICATION FOR THE PREVENTION OR MITIGATION OF HAIL,
by G. K. Sulakvelidze. 23 Oct 62, 3p. 2 refs.
(AID rept. no. 62-176, Trans. from Physical Principles of Cloud Treatment for the Prevention of Hail Phenomena. IN: Akademiya Nauk SSSR. Doklady, 144:4, pp. 778-780, 1962)
Unclassified report

DESCRIPTORS: *Hail, *Clouds, Meteorology, Particles, Precipitation, Atmospheres, Physical properties.

AD-288 070 Div. 2
(TISTB/SAT) OTS price $2.60

Ionospharen-Institut Breisach (Germany).
SOLAR AND LUNAR TIDES IN THE DRIFT OF THE E REGION,
by E. Harnischmacher and K. Rawer. 30 June 62, 19p. incl. illus. 4 refs. (Technical (Scientific) note no. 1)
(Contract AF 61(052)81)
(AFCRL 62-1031) Unclassified report

DESCRIPTORS: *Ionosphere, Drift, Sun, Moon, Meteorological charts, Statistical analysis.

By systematic statistical treatment of a large number of observations standard seasonal drift diagrams for the E region are obtained. Individual groups of days are compared with the standards and this is done for the prevailing component as well as the 12 h rotational component. In this way it could be stated that the declinations of sun and moon have an important and rather similar influence on both components. (Author)

AD-288 091 Div. 2
(TISTB/MS) OTS price $3.60

Institute of Atmospheric Physics, U. of Arizona, Tucson.
MEASUREMENT OF ATMOSPHERIC WATER VAPOR BY A SPECTROPHOTOMETRIC TECHNIQUE,
by Earl W. McMurry. 21 Sep 62, 15p. illus. 9 refs. (Scientific rept. no. 19)
(Contract Nonr-2173(02)
Unclassified report

DESCRIPTORS: *Atmosphere, *Water vapor, Spectrographic analysis, Measurement, Test methods, Distribution.

A spectroscopic technique was used to measure the total amount of water vapor between the point of observation and the sun. Measurements were taken continuously throughout the day, yielding a detailed picture of water vapor variations as a function of time. Results from 28 days of observation over a period of a year show a wide variety of situations ranging from days of relatively stable and constant precipitable water vapor W to days in which large changes occur, sometimes quite abruptly. The median value of the range of W within successive one-hour periods was found to be 0.05 in, with ten per cent of all ranges exceeding 0.12 in, the latter amounting to about fifteen per cent of the annual mean of W at the locality in question. It is concluded that significant W-fluctuations are commonly missed in routine radiosonde practice. Natural variations of W are, on the average, somewhat greater than the instrumental errors of radiosondes. Crude estimates of moist bubble diameters of 0.5 to 12 kilometers were obtained. (Author)

AD-288 101 Div. 2
(TISTP/FR) OTS price $1.60

Texas A. and M. Coll., College Station.
SEISMIC REFRACTION PROFILES ON THE OUTER RIDGE NORTH OF PUERTO RICO,
by Peter Dehlinger and J. W. Antoine. 30 Sep 62, 14p. incl. illus. refs.
(Contracts N7onr-84702, Proj. NR 083-036 and Nonr-21194, Proj. 083-836)
Unclassified report

DESCRIPTORS: *Ocean bottom, *Seismic waves, Refraction, Explosions, Measurement, Statistical analysis.

Eighteen seismic refraction profiles were shot in the Puerto Rico Trench and Outer Ridge areas. Three of these profiles, 108, 109, and 115, located on the Outer Ridge, were analyzed, and corresponding crustal sections were constructed. Crustal layers obtained from the 3 profiles are in good agreement with those obtained by other workers analyzing intersecting profiles. The crustal section in the Outer Ridge appears to be relatively uniform, consisting of at least 4 and possibly 5 layers above the Mohorovicic discontinuity. This discontinuity is found to vary in depth from 11.5 to nearly 13 km along the 3 profiles, where the material below the discontinuity exhibited compressional wave velocities of 8.1 to 8.3 km/sec. (Author)

AD-288 103 Div. 2
(TISTP/GRW) OTS price $2.60

Texas A. and M. Coll., College Station.
CRUSTAL STRUCTURE ACROSS THE WEST FLORIDA ESCARPMENT FROM GRAVITY DATA.
Master's thesis,
by Roy B. Gibson, Jr. Aug 62, 22p. incl. illus. 16 refs.
Unclassified report

DESCRIPTORS: *Gravity, Geological survey, Geodetic data, Gulf of Mexico, Recording devices, Shipborne, Florida straits.

Surface-ship gravity data were obtained along a profile across the West Florida escarpment in December, 1961. Combining the new gravity data with previously existing geological and geophysical information, two crustal structural models were constructed across the escarpment which fit the observed free-air gravity anomalies. One model was based on the assumption that the escarpment is caused by a reef build-up, and the other by crustal faulting. The gravity data are thus consistent with either a tectonic or non-tectonic origin of the escarpment. (Author)

AD-288 107 Div. 2, 8
(TISTP/GRW) OTS price $1.60

Dominion Physical Lab., Dept. of Scientific and Industrial Research (New Zealand).
RECEPTION OF GBR(16Kc/s) AT SCOTT BASE, ANTARCTIC,
by D. D. Crombie. 15 Mar 62, 13p. incl. illus. tables, 3 refs. (Scientific rept. no. 1)
(Contract AF 64(500)8, Proj. 5630)
(AFCRL 62-169) Unclassified report

DESCRIPTORS: *Radio signals, *Magnetic storms, Very low frequency, Ionospheric disturbances, Antarctic regions, Diurnal variations.

The results of one year's observations of the amplitude of 16 kc signals from GBR Rugby received at Scott Base, Antarctica, are discussed. The diurnal variation suggests that the signals are received over the long great circle path. There is slight evidence that the attenuation of this path during daylight hours increases with geomagnetic activity. (Author)

AD-288 108 Div. 2, 8
(TISTP/GRW) OTS price $1.60

Dominion Physical Lab., Dept. of Scientific and Industrial Research (New Zealand).
VARIATIONS IN PHASE PATH OF MAN-MADE ONE-HOP WHISTLER MODE SIGNALS AT 18.6 KC/S,
by D. D. Crombie, F. A. McNeill, and G. M. Allcock. 16 Feb 62, 6p. incl. illus. 3 refs.
(Scientific rept. no. 2)
(Contract AF 64(500)8)
(AFCRL 62-710) Unclassified report

DESCRIPTORS: *Radio signals, *Frequency

shift, New Zealand, Wave transmission, Very low frequency.

Some observations on the phase stability of one-hop whistler mode signals on 18.6 kc from the VLF transmitter NPG situated near Seattle, USA, were made in New Zealand. These signals are characterized by a change in frequency presumably introduced by variations in the phase path length. The observations indicate that the phase path length alters at a rate of about 1 km/sec and total changes in the order of 200 km can occur in a period of three minutes. Possible methods of determining where and how the phase variations occur are suggested. (Author)

AD-288 132 Div. 2, 12, 15
(TISTP/WH) OTS price $2.60

Philco Corp., Palo Alto, Calif.
METHOD FOR IMPROVING NEAR-SINGULARITY OF DIFFERENTIAL CORRECTION MATRIX.
14 Sep 62, 21p. (Rept. no. WDL-TR 1907)
(Contract AF 04(695)113)
Unclassified report

DESCRIPTORS: *Celestial mechanics, *Orbital flight paths, *Partial differential equations, *Matrix algebra, *Drag.

This mathematical analysis presents a method for improving near-singularity of a differential connection matrix, as applied to orbiting satellites. The document contains an approximation to a partial derivative matrix, analysis of a normal equation, modification of a normal equation to improve the near-singularity of the matrix, modification of variational equations with and without drag, and determination of drag parameters. (Author)

AD-288 139 Div. 2
(TISTB/SAT) OTS price $4.60

Hawaii Inst. of Geophysics, Honolulu.
STRATOSPHERIC TEMPERATURE VARIATION OVER THE TROPICAL PACIFIC,
by Hugo de la Cruz. Aug 62, 38p. incl. illus. tables, 19 refs. (Scientific rept. no. 4; Rept. no. 23)
(Contract AF 19(604)7229, Proj. 8641)
(AFCRL 62-898) Unclassified report

DESCRIPTORS: *Stratosphere, *Meteorology, Pacific Islands, Temperature, Wind, Atmosphere, Meteorological charts, Meteorological data, Tropical regions.

Temperature variations in the lower stratosphere over the tropical Pacific were studied in detail. Seasonal temperature maps for the 100, 50, and 25 mb levels were drawn for the period 1956 through 1959. Monthly temperature variations along the meridians 140 and 170 degrees E were studied. Charts of the annual variation of average temperatures were made for selected stations. Time sections of the temperature field and winds along the two selected meridians were compared. Harmonic analysis on the temperature data of several stations was done for levels 150 to 25 mb. Results indicate that there is a seasonal variation of temperature with minimum temperatures occurring during January or February in the lower equatorial stratosphere. Over the equatorial areas, there appears to be some relationship between stratospheric temperature variations and zonal wind reversals at 50 mb. Harmonic analysis reveals that, at 50 and 25 mb levels over the equatorial Pacific, the period of the temperature fluctuation is dominated by a 26- or 24-month period and an annual period, but at 100 mb the annual period is dominant. (Author)

AD-288 147 Div. 2
(TISTP/LH) OTS price $1.10

4th Weather Wing, Colorado Springs, Colo.
AN OBJECTIVE AID FOR FORECASTING STRONG AND GUSTY SURFACE WINDS AT LARSON AFB, WASHINGTON,
by Thomas H. Simmonds. Oct 62, 4p. illus.
Unclassified report

DESCRIPTORS: *Weather forecasting, *Wind, Meteorology, Meteorological data, Analysis, Washington.

AD-288 154 Div. 2
(TISTA/GEC) OTS price $1.10

Aerospace Information Div., Washington, D. C.
AIRCRAFT-ICING HAZARDS.
8 Aug 62, 2p. (AID rept. no. 62-116; Trans. from Teslenko, Aleksey Ivanovich. Obledeneniye aviatsionnykh gazoturbinnykh dvigateley (Icing of Aircraft Gas-Turbine Engines). Moskva, Voyenizdat, 103p. 1961)
Unclassified report

DESCRIPTORS: *Ice prevention, Aircraft, USSR, Hazards, Atmosphere, Meteorology, Cumulus clouds.

AD-288 219 Div. 2
(TISTP/GRW) OTS price $10.50

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
STRATIGRAPHIC STUDIES IN THE SNOW AND FIRN OF THE GREENLAND ICE SHEET,
by Carl S. Benson. July 62, 1v. incl. illus. tables, refs. (Research rept. no. 70)
Unclassified report

DESCRIPTORS: *Snow, Physical properties, Climatic factors, Classification, Photographs, Tables, Greenland.

During a 4-yr period (1952-55) 146 pit studies and 288 supplementary Rammsonde profiles were made along 1100 miles of oversnow traverse in western Greenland. Temperature, density, ram hardness, and grain size were measured in the strata exposed in each pit. Stratification of snow, resulting from variations in conditions of deposition and emphasized by diagenesis, gives a sequence of recognizable annual layers in the upper 10 to 20 m which can be correlated between pits to provide a picture of annual accumulation. The concept of facies is applied to the ice sheet. Four diagenetic facies are recognized: (1) ablation; (2) soaked; (3) percolation; and (4) dry-snow. A revised estimate for the balance of the ice sheet gives a slightly positive balance which is interpreted to mean that the Greenland ice sheet is essentially in equilibrium with present-day climate.

AD-288 225 Div. 2
(TISTP/FR) OTS price $2.50

National Bureau of Standards, Boulder, Colo.
CHARACTERISTICS OF POINT-TO-POINT TROPOSPHERIC PROPAGATION AND SITING CONSIDERATIONS,
by R. S. Kirby, P. L. Rice, and L. J. Maloney.
19 Oct 61, 1v. incl. illus. tables, refs. (NBS Technical note no. 95)
(ESD TDR 62-293) Unclassified report

DESCRIPTORS: *Radio communication systems, *Propagation, Radio waves, Scattering, Diffraction, Refraction, Attenuation.

Since World War II there has been a tremendous development and expansion of telecommunication facilities in the frequency range above 100 mc.

Particularly at these frequencies, the characteristics of the atmosphere and terrain affect the propagation of radio waves. The presence of the troposphere manifests itself in many ways. One of its more important characteristics is the mechanism which causes more efficient radio wave propagation than can be accounted for by diffraction alone. There have been several different theories put forth to explain this phenomenon (all of which involve the troposphere, and in some instances the stratosphere as well) and the effect of the variations in atmospheric refractive index upon the propagation of electromagnetic waves. Layers and ducts, which are characterized by horizontally homogeneous discontinuities in the vertical gradient of refractive index, inffluence line-of-sight paths as well as non-line-of-sight paths. Regular fading as well as prolonged space-wave fadeouts are associated with these atmospheric conditions. (Author)

AD-288 229 Div. 2
(TISTP/FR) OTS price $1.10

Radio Observatory, Calif. Inst. of Tech., Pasadena.
POLARIZATION OF THE 2840 MC/S RADIATION FROM JUPITER,
by D. Morris and J. F. Bartlett. 1962, 3p. illus. 5 refs.
(Contract Nonr-22019)
Unclassified report

DESCRIPTORS: *Extraterrestrial radio waves, Jupiter, Ultra high frequency, Polarization.

Measurements made at the Caltech Radio Observatory on the 2840 mc (10.6 cm) radiation from Jupiter are summarized. The results are compared with similar measurements made earlier at 960 mc (31 cm) and 1390 mc (22 cm). The observations were made during the week 14-21 Apr 1962 with an interferometer of baseline 300 lambda E-W. At this antenna separation, Jupiter was unresolved and values were obtained for the total flux, fractional linear polarization and position angle of the electric vector of the radiation. To obtain an adequate signal to noise ratio it was necessary to integrate the fringes for periods of the order of 20 min. For this purpose an analog computer and mechanical integrator were used. (Author)

AD-288 236 Div. 2
(TISTP/FR) OTS price $3.60

Rhode Island U., Kingston.
DIURNAL VARIATION AND SOME OTHER CHARACTERISTICS OF EXTREMELY LOW FREQUENCY MAGNETIC FIELDS,
by C. Polk. 2 Aug 62, 33p. incl. illus. tables, 21 refs. (Scientific rept. no. 2)
(Contract AF 19(604)7252, Proj. 4603)
(AFCRL 62-734) Unclassified report

DESCRIPTORS: *Terrestrial magnetism, Extremely low frequency, Diurnal variations, Periodic variations, Measurement, Instrumentation.

Amplitude versus time records of 2-minute duration of North-South and East-West magnetic field variations in the 5 to 20 cps frequency range, and 24-hour records of 7.5 to 10 cps magnetic fields which were obtained over a period of several months are analyzed. It appears that the most prominent frequency of individual wave trains in this frequency range is not constant, that some imperfect correlation exists between ELF noise and solar activity, and that 7.5 to 10.0 cps ELF intensity (recorded on an East-West coil) is normally higher during daylight hours than the corresponding ELF intensity recorded at night. The diurnal variation of ELF intensity averaged over a 75 day period between April and July 1962 closely resembles the diurnal variation of thunderstorm activfty in the Western hemisphere, based upon data accumulated before 1960. (Author)

AD-288 263 Div. 2
(TISTW/RD) OTS price $7.60

Boeing Scientific Research Labs., Seattle, Wash.
INFRARED MAPPING OF LUNAR CRATERS DURING THE FULL MOON AND THE TOTAL ECLIPSE OF SEPTEMBER 5, 1960,
by J. M. Saari and R. W. Shorthill. July 62, 21p. illus. tables, 20 refs. (Document no. D1-82-0176)
(Contract AF 18(600)1824)
Unclassified report

Also available from the author.

DESCRIPTORS: *Moon, *Infrared scanning, *Mapping, Terrain, Surfaces, Thermal radiation.

Infrared measurements were made over certain lunar crater regions during the eclipse of September 5, 1960 and the full moon. Five rayed craters were observed to cool less rapidly than their environs during the eclipse, the anomaly being greatest for Tycho and progressively less for Aristarchus, Copernicus, Proclus, and Kepler. The findings are discussed in terms of the thermal properties of the surface, including thickness of insulating layer and age of the craters. Localized variations were found during illumination, evidently attributable to variations in albedo and geometry. (Author)

AD-288 295 Div. 2
(TISTP/LMH) OTS price $2.60

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
THE FROST BEHAVIOR OF SOILS: LABORATORY AND FIELD DATA FOR A NEW CONCEPT. PART II: HORIZONTAL SORTING,
by Arturo E. Corte. Sep 62, 20p. incl. illus. 10 refs. (Research rept. no. 85, pt. 2)
Unclassified report

DESCRIPTORS: *Soils, Freezing, Melting, Mechanical properties, Particles, Rock, Ice.

Laboratory experiments were performed with a special 'closed-system' side-freezing cabinet in which completely saturated soil samples were subjected to alternate freeze-thaw cycles without surcharge. A vertical or nearly vertical freeze-thaw plane was obtained in the side-freezing cabinet. The soil used was a straight graded noncohesive material with 14% finer than the No. 200 (0.074 mm) mesh sieve. According to frost criterion based only on gradation, the soil would be classified as a 'never frost-heaving moraine soil' or 'non-frost-susceptible'. All experiments were run for 20 and 22 cycles. Freezing rates used were as follows: 30.0 mm/hr; 33.0 mm/hr; and 42.0 mm/hr. The initial dry density was approximately constant for each test at 1.8 g/cm3 or 112.4 lb/ft3, and complete saturation was maintained in the tests. (Author)

AD-288 296 Div. 2
(TISTP/JW) OTS price $3.60

Army Engineer Geodesy, Intelligence and Mapping Research and Development Agency, Fort Belvoir, Va.
PRACTICAL TESTS OF THE THEORETICAL ACCURACY OF

AERIAL TRIANGULATION,
by K. Bertil P. Hallert. 31 May 62, 34p. incl. illus. tables, 7 refs. (GIMRADA Research note no. 1)

Unclassified report

DESCRIPTORS: *Aerial photography, *Mapping, Errors, Reliability, Statistical processes, Photographic intelligence, Transformations.

The effectiveness of a method for predicting the accuracy of aerial triangulation by means of a theoretical analysis after a numerical correction procedure is tested. The method used involves the summation formulas of aerial triangulation, the measured residual y-parallaxes in the individual models, elevation discrepancies in the scale transfer points, and general statistical procedures. The parallaxes and elevations were first corrected for known and specially determined regular (systematic) errors of the fundamental operations (the image coordinates of the photographs, the projection devices of the instrument, and the operator). The accuracy of the corrections were determined as standard errors with the aid of error propagation formulas and the basic standard errors of unit weight. The discrepancies between the final photogrammetric coordinates and the corresponding (true) geodetic coordinates in check points were determined and compared with the theoretically predicted values of the standard errors. Statistical methods were finally applied for a test of the significance of the deviations between theory and practice. The agreement between theory and practice was found to be so good in this experiment that the basic theory can be accepted. It is also concluded that further experiments are necessary, particularly for investigation of the fundamental operations and the sources of the errors and discrepancies. (Author)

AD-288 299 Div. 2
(TISTP/GRW) OTS price $1.10

Yerkes Observatory, Williams Bay, Wis.
THE PHYSICAL CHARACTERISTICS AND DISTRIBUTION IN SPACE OF GALAXIES.
Status rept.,
by W. W. Morgan. 9 Nov 62, 2p.
(Contract Nonr-189100, Proj. NR 046-759)

Unclassified report

DESCRIPTORS: *Galaxies, Radio astronomy.

AD-288 536 Div. 2
(TISTP/GRW) OTS price $2.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
APPLICATION OF X-RAY DIFFRACTION TO OCEANIC SOIL ANALYSIS,
by R. J. Smith and J. B. Crilly. 26 Oct 62, 23p. incl. illus. 8 refs. (Technical rept. no. R-213)

Unclassified report

DESCRIPTORS: *Ocean bottom, *Soils, *X-ray diffraction analysis, Clays, Sedimentation.

The Core Borings in Deep Ocean subtask of the general Structures in Deep Ocean program is designed to gain familarity with means of obtaining and treating undisturbed samples from the floor of the deep sea relative to their supporting abilities. One of the major problems connected with oceanic soil work pertains to distinguishing the various soil types that all have much visual similarity. To determine the suitability of X-ray diffraction methods for investigating its compositional characteristics, a representative sample of ocean floor soil procured from a 1200-foot water depth on the continental shelf off the Port Hueneme harbor entrance was subjected to analysis. The sample was broken into plus-200-mesh, minus-200-mesh, and clay fractions by means of a sieving and centrifuging process. Diffraction patterns obtained for the clastic fraction verified results of microscopic compositional estimates. X-ray analysis of the clay fraction indicated the presence of kaolinitic, illitic, and montmorillonitic types. The effects on the patterns of varying instrument settings and scanning rates are described. It is recommended that diffraction patterns be obtained in conjunction with normal test measurements to assist in discriminating between fine-grained soil constituents. (Author)

AD-288 606 Div. 2
(TISTP/FR) OTS price $3.60

Free U., Berlin (Germany).
EXAMINATION OF 24 HOUR SURFACE CHARTS.
Final technical rept., 1 Aug 61-31 July 62,
by R. Scherhag. 31 July 62, 10p. tables.
(Contract DA 91-591-EUC-1921)

Unclassified report

DESCRIPTORS: *Weather forecasting, *Meteorological charts, *Barometric pressure, Cyclones, Anticyclones, Statistical analysis.

Investigating the 24-hour prognostic charts of the OFFENBACH, DUNSTABLE, BRACKNELL, and MOSCOW Weather Services by new statistical methods (explained in Final Technical Report, Contract No. DA-91-591-EUC-1159, OI-1493-59), the data hitherto compiled has been searched under several aspects. The results permit an interpretation of the effectiveness of the prognoses. In addition, a similarity has been found between DUNSTABLE, BRACKNELL, AND MOSCOW prognostic charts of 0000 GMT concerning the western part of the prognostic area. This striking simularity has been observed to occur periodically. (Author)

AD-288 663 Div. 2
(TISTP/FR) OTS price $2.60

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
THE GENERATION AND EFFECT OF ELECTROSTATIC FIELDS DURING AN AURORAL DISTURBANCE.
Scientific rept. no. 17 on Research Concerning Forecasting Anomalous Propagation at High Latitudes,
by Daniel W. Swift. 9 Nov 62, 18p. incl. illus. 9 refs. (Technical memo. RAD-TM-62-88)
(Contract AF 19(604)4092, Proj. 4603)
(AFCRL 62-758) Unclassified report

DESCRIPTORS: *Aurorae, *Electric fields, Magnetic fields, Electrons, Ionization, Wind, Equations, Motion.

The equations of motion of electrons and ions in the presence of electric, magnetic, and neutral particle velocity fields are derived for conditions which are apt to exist in an auroral arc. The electric field resulting from charge separation is computed. Electron densities, charged particle motion, and electric currents are also computed. It is shown how these computations can account for magnetic bays, electron drifts and electric field fluctuation observed during auroral disturbances. Analytical expressions for electric field strengths and neutral plasma drift velocities are derived. (Author)

AD-288 821 Div. 2
(TISTP/FR) OTS price $2.60

RAND Corp., Santa Monica, Calif.
RADIO WAVE ABSORPTION DUE TO ELECTRON-ION

COLLISIONS IN THE EARTH'S ATMOSPHERE ABOVE 100 km,
by C. M. Crain. Nov 62, 17p. incl. illus. 1 ref. (Research memo. no. RM-3391-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Radio waves, Gases, Ionization, Absorption, Attenuation, Electrons, Ions, Atmosphere.

Calculations and graphs are presented showing the attenuation of radio waves in low-density ionized gases, in which the principal contribution to attenuation is due to electron-ion collisions. Numerical results are presented for electron temperatures in the range of 1000 to 40,000 K, for plasma frequencies in the range of 10 to 10,000 mc, and for transmission frequencies in the range of 1 to 10 times the plasma frequency. The results are particularly applicable to the earth's atmosphere above about 100 km under conditions of abnormally high ionization, such as may result from a high-altitude nuclear detonation. (Author)

AD-288 872 Div. 2
(TISTP/LMH) OTS price $1.60

California U., Berkeley.
PRESSURE AS A FUNCTION OF DISTANCE, PART II,
by F. N. David and M. K. Gupta. 31 Oct 62, 15p. incl. tables (Scientific rept. no. 4)
(Contract AF 19(604)8051, Proj. 8624)
(AFCRL 62-1012)
Unclassified report

DESCRIPTORS: *Barometric pressure, Diurnal variations, Position finding, Height finding, Polynomials, Least squares method.

The data of experience give the correlation in the pressures recorded at pairs of stations situated at varying distances apart. Starting with an arbitrarily chosen stochastic model, a model so chosen approximately to describe the observed effects, a formula for the correlation for any pair of stations is deduced. The parameters in the model were guessed so that the cross-sections of the correlation-distance surface have the same kind of pattern as those observed in the observed data, and the theoretical correlations between the pressures at several pairs of stations were calculated. The agreement, for stations reasonably close together, between the observed correlations and those deduced from the model, is enough for accurate estimation (instead of guesswork) of the parameters in the model to be worthwhile carrying out. The results of calculations with the model, using accurately estimated parameters, will indicate possible desirable modifications. (Author)

AD-288 883 Div. 2
(TISTP/FR) OTS price $26.00

Miller-Columbian Reporting Service, Washington, D. C.
PROCEEDINGS GOVERNMENT-INDUSTRY OCEANOGRAPHIC INSTRUMENTATION SYMPOSIUM, WASHINGTON, D.C., AUGUST 16 AND 17, 1961, SPONSORED BY INTERAGENCY COMMITTEE ON OCEANOGRAPHY OF THE FEDERAL COUNCIL FOR SCIENCE AND TECHNOLOGY,
ed. by Julius Rockwell, Jr. 1961, 482p. incl. illus. refs.
Unclassified report

DESCRIPTORS: *Oceanography, *Instrumentation, Oceanographic vessels.

The proceedings include the 25 papers presented at the Government-Industry Oceanographic Instrumentation Symposium by top administrators and scientists, answers by panel members to questions received from the floor, lists of the scientific and industrial laboratories concerned with oceanographic research and development, lists of instrumentation developments now required for oceanographic survey and research, and other miscellaneous information.

AD-288 910 Div. 2, 30
(TISTP/GRW) OTS price $2.60

Te Co., Santa Barbara, Calif.
GROUND BASED MAPPING OF UPPER AIR WINDS,
Quarterly progress rept. no. 1, 1 July-30 Sep 62, by H. P. Wurtz. 30 Sep 62, 21p. incl. illus. tables.
(Contract DA 36-039-sc-90685, Proj. 3A99-27-005-09)
Unclassified report

DESCRIPTORS: *Radiometers, Interference, Optical filters, Reliability, Wind, Upper atmosphere, Velocity, Design.

This analysis covers the work in which upper air wind velocities will be related to radiometric data obtained from infrared radiation of the ozone layer. Work was concerned with the design and related problems of the special radiometer. (Author)

AD-288 967 Div. 2
(TISTP/JW) OTS price $1.10

Aerospace Information Div., Washington, D. C.
TELLURIC CURRENTS IN ANTARCTICA.
21 May 62, 3p. (AID rept. no. 62-69; Trans. from Sovetskaya Antarkticheskaya ekspeditsiya. Vtoraya kontinental'naya ekspeditsiya 1956-1958 gg.; nauchnyye rezul'taty (Trudy, t. 9). Leningrad, Izd-vo Morskoy transport, pp. 10-24, 1960)
Unclassified report

DESCRIPTORS: *Earth, *Electromagnetic fields, *Pulse modulation, Earthquakes, Seismic waves, Antarctic regions.

AD-288 968 Div. 2
(TISTP/JW) OTS price $1.10

Aerospace Information Div., Washington, D. C.
STUDY OF VERTICAL MOVEMENTS IN THE EARTH'S CRUST.
29 May 62, 3p. (AID rept. no. 62-73; Trans. from Geodeziya i kartografiya, no. 2, pp. 11-16, Feb 62)
Unclassified report

DESCRIPTORS: *Earth, *Motion, Vertical indicators, Deformation, Measurement.

AD-288 969 Div. 2, 9
(TISTP/JW) OTS price $1.10

Aerospace Information Div., Washington, D. C.
IONOSPHERIC DISTURBANCES.
11 June 62, 2p. (AID rept. no. 62-76; Trans. from Glavnoye upravleniye severnogo morskogo puti. Arkticheskiy i Antarkticheskiy nauchno-issledovatel'skiy institut. Problemy Arktiki i Antarktiki. Sbornik statey, vyp. 5. Leningrad, Izd-vo Morskoy transport, pp. 47-52, 1960)
Unclassified report

DESCRIPTORS: *Ionospheric disturbances, *Magnetic storms, Storms.

AD-288 972 Div. 2
(TISTP/JW) OTS price $1.10

Aerospace Information Div., Washington, D. C.
EFFECT OF SOLAR ACTIVITY ON DYNAMICS OF THE

EARTH.
10 June 62, 2p. (AID rept. no. 62-75; Trans. from Eygenson, M. S. Cosmic factors of geotectonics. IN: Akademiya nauk SSSR. Izvestiya. Seriya geologicheskaya, no. 4, pp. 7-12, Apr 62)
Unclassified report

DESCRIPTORS: *Solar energy, *Earth, *Dynamics, Geophysics, Geology.

AD-288 974 Div. 2
(TISTP/JW) OTS price $1.10

Aerospace Information Div., Washington, D. C.
FORECASTING HIGH-ALTITUDE CLOUDS.
18 June 62, 2p. (AID rept. no. 62-81; Trans. from Reshetov, G. D. Cloudiness at high altitudes. Meteorologiya i gidrologiya, no. 4, pp. 39-43, 1962)
Unclassified report

DESCRIPTORS: *Weather forecasting, *High altitude, *Clouds.

AD-288 978 Div. 2
(TISTW/RD) OTS price $1.10

Aerospace Information Div., Washington, D. C.
CONFERENCE ON VERTICAL MOVEMENTS OF THE EARTH'S CRUST.
9 July 62, 2p. (AID rept. no. 62-98; Trans. from Geodeziya i kartografiya, no. 4, pp. 74-76, Apr 62)
Unclassified report

DESCRIPTORS: *Earth, *Surface properties, *Geological survey, USSR, Conferences.

AD-288 979 Div. 2
(TISTP/JW) OTS price $1.10

Aerospace Information Div., Washington, D. C.
STANDARDIZATION OF CONSTANTS FOR AGE ESTIMATION BY THE ARGON METHOD.
9 Aug 62, 1p. (AID rept. no. 62-114; Trans. from Akademiya nauk SSSR. Izvestiya, Seriya geologicheskaya, no. 6, pp. 3-11, 1962)
Unclassified report

DESCRIPTORS: *Age factors, *Geology, Argon.

AD-289 000 Div. 2
(TISTB/LMH) OTS price $7.60

Institute of Geodesy, Photogrammetry and Cartography, Ohio State U, Research Foundation, Columbus.
INTERPOLATION AND PREDICTION OF GRAVITY AND THEIR ACCURACY,
by Helmut Moritz. Aug 62, 69p. incl. illus. tables, 7 refs. (Rept. no. 24)
(Contract AF 19(604)6201, Proj. 7600)
(AFCRL 62-1028)
Unclassified report

DESCRIPTORS: *Gravity, *Geophysics, Mathematical prediction, Correlation techniques, Measurement, Determination, Errors, Matrix algebra, Least squares method.

Several methods for interpolation and extrapolation of gravity are described, such as geometrical interpolation, zero anomaly, representation, and least squares prediction. General formulas for the accuracy of any prediction method are deduced. Least squares prediction, which is the most accurate one, permits a purely numerical processing of gravity anomalies and seems to be excellently suited for electronic computers. The accuracy of the usual prediction methods is shown generally and by means of numerical examples and the influence of the configuration of gravity stations is studied. The prediction of mean anomalies is considered. The important correlation of free-air anomalies with elevation is discussed, and least squares prediction is extended to this case, giving matrix formulas which can be used for machine computations. The validity of the usual method of Bouguer anomalies is investigated, including the error committed by using a wrong Bouguer gradient. (Author)

AD-289 020 Div. 2
(TISTP/JW) OTS price $4.60

Water Conservation Lab., Dept. of Agriculture, Tempe, Ariz.
SURFACE ENERGY BALANCE IN ARID LANDS AGRICULTURE.
Annual rept. for Fiscal year 1962,
by C. H. M. van Bavel, L. J. Fritschen and others. Nov 62, 37p. incl. illus. tables, 4 refs.
Unclassified report

DESCRIPTORS: *Energy, *Water, *Micrometeorology, Air, Atmosphere, Climatic factors, Meteorological data, Temperature, Moisture, Heat, Irrigation systems, Surface properties.

The energy balance of bare surfaces was studied. Though the disposition of net radiation over a 24-hour period depends markedly on the moisture content of the surface, in most cases there was a net heat loss to the air. During the late afternoon and the early hours of darkness, energy was gained by a wet or moist surface from the air to offset latent heat losses. The indisputable and direct results of energy balance measurements are at variance with temperature profile studies, the latter often indicating a sensible heat flow close to the surface-in the lower 50 cm-opposed to that found from the energy balance. Conventional turbulent exchange ideas seem unapplicable under the circumstances of measurement. A direct physical analysis of evaporation from the surface showed the necessity of simultaneous and frequent measurement of soil temperature and moisture content in great detail. A preliminary set of data indicates that further studies can be made with success. Data obtained over an emerging grass crop indicate that compared with wet, bare soil, reflection is less and net radiation is greater but, nevertheless, evaporation is smaller owing to increased transfer of heat to the air. (Author)

AD-289 031 Div. 2, 20
(TISTW/RD) OTS price $1.60

Air Force Technical Applications Center, Washington, D. C.
AFTAC MAGNETIC TAPE RECORDING STANDARDS PROJECT VELA-UNIFORM,
by Ben S. Melton. 25 Oct 62, 15p. incl. illus. table (AFTAC technical rept. no. VU-62-1)
Unclassified report

DESCRIPTORS: *Nuclear explosions, *Underground explosions, *Seismic waves, Seismological stations, Earthquakes, Seismographs, Magnetic recording systems, Magnetic tape, Detection, Measurement.

AD-289 032 Div. 2, 6
(TISTP/GRW) OTS price $2.60

Air Force Cambridge Research Labs., Bedford, Mass.
LUNAR THERMAL EMISSION MEASUREMENTS.
Research rept.,
by John P. Castelli and Carl P. Ferioli. Sep 62, 21p. incl. illus. 4 refs. (Rept. no. AFCRL 62-882)
(Proj. 5629)
Unclassified report

DESCRIPTORS: *Moon, *Thermal radiation, *Radio astronomy, Parabolic antennas, Ultra high frequency, Measurement.

During two lunar eclipses, 15 March 1960 and 25 August 1961, simultaneous records of the lunar thermal emission at 1200 to 3100 mc were obtained with the 84-ft radio telescope of the USAF Sagamore Hill Radio Observatory. No change in lunar temperature was measured at either frequency during the eclipses. A simple straightforward method is described to convert antenna temperatures to average disk temperatures of the moon; the latter were found to be 230 K at 1200 mc and 223 K at 3100 mc. (Author)

AD-289 037 Div. 2
(TISTP/GRW) OTS price $3.60

Florence U. (Italy).
STUDY OF IONOSPHERIC ABSORPTION DURING A SOLAR ECLIPSE. PART I. SOLAR ECLIPSE.
Technical rept.,
by N. Carrara, P. F. Checcacci and M. T. de Giorgio. Jan 62, 36p. incl. illus. table, 13 refs.
(Contract AF 61(052)498)
(AFCRL 62-312) Unclassified report

DESCRIPTORS: *Extraterrestrial radio waves, *Ionosphere, *Solar eclipse, Radiometers, Antennas, Electrons, Density, Absorption.

A program of measurements of cosmic noise absorption by the ionosphere was developed in Florence. The purpose was to observe the absorption variation during the solar eclipse of 15 February 1961. A description of the equipment is made and the results are presented. (Author)

AD-289 057 Div. 2, 25
(TISTP/JW) OTS price $2.60

Marine Physical Lab., U. of Calif., San Diego.
MARINE PHYSICAL LABORATORY BIBLIOGRAPHY SUPPLEMENT JULY 1960 - JUNE 1962.
20 Sep 62, 19p. (Rept. no. MPL-U-47/62; SIO Reference 60-41A)
(Contracts Nonr-221605, Nonr-221607, and Nonr-221610)
Unclassified report

DESCRIPTORS: *Acoustics, *Signals, *Physics, Geophysics, Bibliography, Data processing systems

Contents:
Acoustics
  Theory
  Laboratory
  Underwater
  Sonar systems
Signal Processing
  Theory
  Techniques
Marine Geophysics
  Seismic Refraction and Reflection
  Acceleration and Gravity
  Electromagnetics
  Geomagnetics
  Waves, Currents and Turbulence
  Miscellaneous
Physics

AD-289 089 Div. 2, 25
(TISTB/MS) OTS price $1.60

Marine Physical Lab., U. of Calif., San Diego.
MARINE PHYSICAL LABORATORY INTERIM STATUS REPORT.
20 Sep 62, 17p. incl. illus. 70 refs. (Rept. no. MPL-U-16/62; SIO reference 62-22)
(Contracts Nonr-221605, Nonr-221607 and others)
Unclassified report

DESCRIPTORS: *Oceanography, Instrumentation, Acoustics, Geophysics, Sonar signals, Underwater communication systems.

A broad summary of the work in progress under the general headings of acoustics, sonar signal processing and systems, ocean basin characteristics, ocean physical characteristics, and supporting equipment development is given, with references to related publications treating the subject in detail. (Author)

AD-289 207 Div. 2
(TISTP/JW) OTS price $1.10

Technical U., Copenhagen (Denmark).
DIRECT OBSERVATION OF CORRELATION BETWEEN AURORAE AND HISS IN GREENLAND,
by Torben Stockflet Jorgensen and Eigil Ungstrup.
27 Feb 62, 2p. illus. 1 ref. (Technical note no. 2; Rept. no. 11)
(Contract AF 61(052)298)
(AFCRL 62-1033) Unclassified report

DESCRIPTORS: *Aurorae, *Astronomy, Intensity, Greenland, Analysis, Ionosphere, Measurement, Diurnal variations.

In Godhavn, Greenland, simultaneous visual observation of aurorae and listening to 8 kc hiss was made during January and February 1961. During these observations a close correlation was found between the instantaneous strength of the hiss and the activity as well as the intensity of the aurorae. (Author)

AD-289 211 Div. 2
(TISTP/FR) OTS price $14.00

United Electrodynamics, Pasadena, Calif.
THEORETICAL PREDICTION OF DEEP WELL NOISE IMPROVEMENT PROPERTIES OF TYPICAL GEOLOGICAL STRUCTURES.
Final rept.,
by G. W. Morris, E. A. Flinn and others.
29 Dec 61, 208p. illus. 4 refs. (Rept. no. AAD62-02)
(Contract AF 33(600)42858, Proj. T/1123)
Unclassified report

DESCRIPTORS: *Seismic waves, *Signal-to-noise ratio, Particles, Velocity, Intensity, Geology.

A method of analysis was devised whereby the body waves in a stratified medium subject to a plane irrotational wave at normal incidence to the strata may be studied. This method was used in conjunction with the matrix method of surface wave analysis to theoretically predict the deep well noise improvement properties of typical geological structures likely to be encountered in the selection of observation sites for a worldwide detection system. The improvement of the signal-to-noise amplitude ratio with depth has been displayed graphically for representative tectonic formations. (Author)

AD-289 212 Div. 2
(TISTP/FR) OTS price $1.60

United Electrodynamics, Pasadena, Calif.
THEORETICAL PREDICTION OF DEEP WELL NOISE IMPROVEMENT PROPERTIES OF TYPICAL GEOLOGICAL STRUCTURES.
Supplement to final rept.,
by B. J. Greer, E. A. Flinn, and G. W. Morris.
29 May 62, 10p. incl. illus. (Suppl. to AD-289 211)
(Contract AF 33(600)42858, Proj. T/1123)
Unclassified report

DESCRIPTORS: *Seismic waves, Signal-to-noise ratio, Geology, Particles, Velocity, Pressure.

The behavior with depth of compressional wave pressure for several complex multi-layered geological structures is discussed. In a previous report, an analysis was presented of the elastodynamic behavior of a stratified semi-infinite medium subject to a plane compressional wave normally incident to the layers. The source of the disturbance was located at the plane boundary between the layers and a homogeneous halfspace below. The indicial response of the system to a unit impulse source function was first obtained, and then the response to a general driving function was obtained by numerical convolution. The particular source function used was a symmetric Ricker wavelet. The analysis yields the time history of the particle velocity and stress, as functions of depth. This supplementary report illustrates the use of the reported analysis in calculating the variation of compressional wave dilatation with depth for some of the geological structures previously considered. (Author)

AD-289 259 Div. 2, 12, 22
(TISTW/RD) OTS price $2.60

Army Mitsile Command, Redstone Arsenal, Huntsville, Ala.
ON THE DIVISION OF THE ATMOSPHERE INTO LAYERS FOR DENSITY CALCULATIONS IN ATMOSPHERIC BALLISTICS,
by Oskar Essenwanger and Helmut P. Dudel.
15 Aug 62, 23p. incl. illus. tables, 4 refs.
(Rept. no. RR-TR-62-6)
Unclassified report

DESCRIPTORS: *Atmosphere, Atmosphere models, Exterior ballistics, Guided missiles, Artillery, Meteorological data, Density, Northern hemisphere.

Subdivisions of the altitude range from surface to 25 km into four to eight layers are presented. These layer combinations were chosen to provide optimum average fit of the corresponding step functions to a combined set of individual air density profiles from the northern hemisphere. Separation into zones such as tropical, temperate, and arctic would render optimum layers different from the presented northern hemisphere combination. The investigation is based on evaluation of samples from the radiosonde stations Guam, Wiesbaden, and Fairbanks. The samples were selected to approximate closely the climatological frequency of occurence of density profiles. (Author)

AD-289 297 Div. 2, 15
(TISTP/TL) OTS price $2.60

Army Engineer Geodesy, Intelligence and Mapping Research and Development Agency, Fort Belvoir, Va.
NEW FORMULAS USEFUL WHEN CHANGING ELLIPSOIDAL PARAMETERS OR ORIENTATION,
by Angel A. Baldini. 30 July 62, 16p. incl. illus. (GIMRADA Research note no. 2)
Unclassified report

DESCRIPTORS: *Mapping,,*Ellipsoids, *Geodetics, *Geodetic data, Aerial photography, Deflection, Difference equations, Taylor's series, Partial differential equations.

The derivation of new general equations is presented for determining the changes in the deflection of the vertical and in the normal distance to an ellipsoid when changing the parameters or orientation of the ellipsoid. The equations are applicable in photogrammetric flash triangulation, Hiran, and other geodetic procedures involving datum ties. This work represents the progress to date in a research study the ultimate objective of which is development of mathematical procedures for determining the parameters of an ellipsoid the center of which is at the center of mass of the earth. (Author)

AD-289 326 Div. 2
(TISTP/TL) OTS price $8.10

Minnesota U. School of Physics, Minneapolis.
TWO ATMOSPHERIC CONSTITUENTS OZONE AND SMALL IONS.
Doctoral thesis,
by John L. Kroening. Sep 62, 78p. incl. illus. tables, 44 refs. (Technical rept. no. AP-20)
(Contract Nonr-71022)
Unclassified report

DESCRIPTORS: *Atmosphere, *Ozone, *Ions, *High altitude, Photochemistry, Detectors, Theory, Bibliography, Diurnal variations, Electrometers, Earth, Surface area, Light, Photomultipliers, Mercury lamps, Measurement.

Contents:
- Ozone
  - The detector
  - The ozone generator
  - Calibration of the ozone generator
  - Operating procedure
  - Photochemistry of atmospheric ozone
  - Results
  - Production of ozone
  - Ozone bibliography
- Small Ions
  - Theory and measurement
  - Small ion bibliography

AD-289 333 Div. 2
(TISTP/TL) OTS price $2.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
THE SUN'S PERTURBING EFFECT ON MOTION NEAR A TRIANGULAR LAGRANGE POINT,
by J. P. deVries. 29 Sep 62, 22p. incl. illus. table.
(Contract AF 49(638)814)
Unclassified report

Presented at the 13th International Astronautical Congress, 23-29 Sep 1962, Varna, Bulgaria.

DESCRIPTORS: *Sun, *Earth, *Moon, *Orbital flight paths, *Celestial mechanics, Motion, Differential equations, Gravity, Perturbation theory, Polynomials, Particles, Integral transforms, Numerical analysis, Integration, Resonance, Taylor's series, Periodic variations.

A linearized four-body problem in motion in the neighborhood of the leading triangular Lagrange point in the earth-moon system is presented. The equations of motion of a planar restricted four-body problem (i.e. circular Moon orbit and circular orbit of Earth-Moon barycenter around the Sun, zero inclination between Moon and Sun orbits) are first written in terms of Jacobi coordinates. The Hamiltonian consists of two parts: one leads to the restricted three-body problem and the other introduces the Sun perturbations. This latter part, which has (mass of Sun/R 3rd power (Earth-Sun)) as a factor, consists of the usual sequence of Legendre polynomials of the angle between the radii to particle and Sun and ''coupling'' terms which contain also the mass of the Moon and the angle between the radii to the particle and the Moon. The equations of motion with respect to the Lagrange point are then obtained by using the constant and linear parts of the series expansion of the Hamiltonian near the Lagrange point. (Author)

AD-289 350 Div. 2
(TISTP/FR) OTS price $2.60

Colorado State U. Research Foundation, Fort Collins.
THE ATMOSPHERIC MICRO-STRUCTURE AND ITS BEARING ON CLEAR-AIR TURBULENCE (CAT).
A preliminary report,
by Elmar R. Reiter. Oct 62, 12p. incl. illus. 16 refs. (Rept. no. CER62ERR62; Technical paper no. 39)
(Contract N189 (188)55120A)
Unclassified report

Original contains color plates; all ASTIA reproductions will be in black and white. Original may be seen in ASTIA Hqs.

DESCRIPTORS: *Turbulence, Atmosphere, Cirrus clouds, Photographic analysis.

AD-289 396 Div. 2
(TISTP/WH) OTS price $2.60

Institute of Geodesy, Photogrammetry and Cartography, Ohio State U. Research Foundation, Columbus.
A STATISTICAL METHOD FOR UPWARD AND DOWNWARD CONTINUATION OF GRAVITY AND ON THE ARRANGEMENT OF GRAVITY STATIONS FOR THE UPWARD CONTINUATION,
by Helmut Moritz. Sep 62, 27p. incl. illus. tables, 7 refs. (Rept. no. 25)
(Contract AF 19(604)6201, Proj. 7600)
(AFCRL 62-1029) Unclassified report

DESCRIPTORS: *Gravity, *Statistical processes, *Statistical functions, *Integration, *High altitude, Geophysics, Determination.

A Statistical Method for Upward and Downward Continuation of Gravity. By replacing the actual gravity anomaly function by a suitable statistical model, it is possible to obtain a function of elevation H so that multiplying any free air gravity anomaly at ground by this function yields an approximate value for the corresponding gravity anomaly at height H. This method which has been tested numerically, can be applied for upward and downward continuation of gravity. Another method for downward continuation is sketched. On the Arrangement of Gravity Stations for Upward Continuation. For moderate elevations, especially for airborne gravimetry, the influence of the arrangement of gravity station and of the neglected outer zones is estimated. Based on this, a specific arrangement is proposed. (Author)

AD-289 400 Div. 2
(TISTP/JW) OTS price $1.10

4th Weather Wing, Colorado Springs, Colo.
AN OBJECTIVE AID FOR FORECASTING STRONG AND GUSTY SURFACE WINDS AT McCHORD AFB, WASHINGTON,
by Thomas H. Simmonds. Aug 62, 5p.
Unclassified report

DESCRIPTORS: *Wind, *Weather forecasting, Surfaces.

AD-289 404 Div. 2
(TISTP/JW) OTS price $2.60

Ghana U. (Africa).
EQUATORIAL STUDY OF IRREGULARITIES IN THE IONOSPHERE.
Summary rept. no. 1, Oct 60-Sep 61,
by R. W. H. Wright. 28 Jan 62, 26p.
(Contract AF 61(052)421)
(AFCRL 62-560) Unclassified report

DESCRIPTORS: *Ionospheric disturbances, *Gold Coast, Scattering, Radio waves.

AD-289 407 Div. 2
(TISTP/JW) OTS price $5.60

Pennsylvania State U., University Park.
SUMMER PRECIPITATION DISTRIBUTION IN CENTRAL PENNSYLVANIA.
Master's thesis,
by Richard Keith Dutton. June 62, 49p.
Unclassified report

DESCRIPTORS: *Precipitation, Pennsylvania, Distribution.

AD-289 415 Div. 2
(TISTP/JW) OTS price $1.10

North Carolina State Coll., Raleigh.
ON THE SUBHARMONIC OSCILLATIONS OF A PENDULUM,
by Raimond A. Struble. Aug 62, 7p. (Technical memo. no. 4; PSR-14)
(Grant DA-ARO(D)-31-124-G81)
(AROD rept. no. 2125:26)
Unclassified report

DESCRIPTORS: *Harmonic oscillators, *Differential equations, Excitation, Nonlinear differential equations.

AD-289 453 Div. 2
(TISTP/WH) OTS price $18.00

Illinois State Water Survey, Urbana.
RAINDROP DISTRIBUTIONS AT MIAMI, FLORIDA,
by E. A. Mueller. June 62, 281p. (Research rept. no. 9B)
(Contract DA 36-039-sc-87280)
Unclassified report

DESCRIPTORS: *Raindrops, *Statistical distributions, Florida.

AD-289 533 Div. 2
(TISTP/FR) OTS price $8.10

Geophysical Inst., U. of Alaska, College.
SOLAR ACTIVITY AND POLAR CAP ABSORPTION EVENTS,
by Anne B. Kahle. July 62, 83p. incl. illus. tables, refs. (Scientific rept. no. 2)
(Contract AF 19(604)5574, Proj. 5631)
(AFCRL 62-708) Unclassified report

DESCRIPTORS: *Absorption, *Solar flares, *Solar energy, Radio waves, Arctic regions, Cosmic rays, Ultraviolet radiation, X rays, Extraterrestrial radio waves.

The known facts about visible characteristics of solar flares and flare associated solar radio emission, solar ultraviolet and x-rays, solar cosmic rays and polar cap absorption, and solar corpuscular streams are briefly reviewed. Tables of data of the occurrence of these phenomena in conjunction with polar cap absorption (PCA) events are given. (Author)

AD-289 534 Div. 2, 25
(TISTP/WH) OTS price $2.60

Florence U. (Italy).
STUDY OF IONOSPHERIC ABSORPTION DURING A SOLAR ECLIPSE. PART III: IONOSPHERIC MEASUREMENTS BY MEANS OF SIGNALS FROM ARTIFICIAL SATELLITES.
Technical rept.,
by P. F. Checcacci and M. T. de Giorgio. Jan 62, 24p. incl. illus. tables, 9 refs.
(Contract AF 61(052)498)
(AFCRL 62-312, vol. 3) Unclassified report

DESCRIPTORS: *Satellite vehicles, *Radio signals, *Wave transmission, *Magneto-optic rotation, *Ionospheric propagation, *Terrestrial magnetism, *Magnetohydrodynamics.

Ionospheric investigation by means of satellite transmission carried out under the present Contract is described. Particular emphasis is given to the hop propagation phenonema. A description of the new apparatus is also given. (Author)

AD-289 543 Div. 2
(TISTB/MS) OTS price $10.50

Harvard Coll. Observatory, Cambridge, Mass.
CLASSIFICATION OF SOLAR PROMINENCES FOR SUNSPOT CYCLE NO. 19 - 1955,
by Donald H. Menzel and F. Shirley Jones. Sep 62 135p. incl. tables, 2 refs. (Scientific rept. no. 13)
(Contract AF 19(604)4962, Proj. 7649)
(AFCRL 62-893) Unclassified report

DESCRIPTORS: *Sunspots, *Solar disturbances, Tables.

A tabulation and analysis is given of the behavior classification of prominences observed during 1955 at the High Altitude Observatory at Climax, Colorado, and at the Sacramento Peak Observatory, Sunspot, New Mexico. Similar studies for the years 1944 to 1954 have appeared in Scientific Report No. 42 under Contract AF19(604)-146; Scientific Reports No. 3, 4, 5, 9, 11, and 13 under Contract AF19(604)-1394; and Scientific Reports No. 3, 5, 7, and 9 under Contract AF19(604)-4962. A summary for the years 1944 to 1954, sunspot cycle No. 18, appeared as Scientific Report No. 12 under Contract AF19(604)-4962. (Author)

AD-289 552 Div. 2, 5
(TISTP/GRW) OTS price $5.60

Norwegian Defence Research Establishment.
EXPERIMENTAL STUDIES OF THE IONOSPHERIC D-REGION. Final technical rept.,
by R. Barrington, B. Landmark and others.
June 62, 57p. incl. illus. tables, 17 refs.
(NDRE rept. no. 44)
(Contract AF 61(052)526)
(AFCRL 62-798) Unclassified report

DESCRIPTORS: *Ionospheric disturbances, *Electrons, Radio interference, Diurnal variations, Periodic variations, Intensity, Density.

The quiet D-region
Principles of cross modulation
The choice of theory and parameters
Discussion of the accuracy of the results
Results from observations at Kjeller
The behavior during the twilight periods
Multistation riometer observations of sudden ionospheric disturbances
Observations

Interpretation and discussion of results
Correlation with solar flare characteristics

AD-289 576 Div. 2
(TISTP/GRW) OTS price $1.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
AN ORDVAC PROGRAM FOR THE TRANSFORMATION OF GEODETIC ELLIPSOIDAL COORDINATES INTO CARTESIAN COORDINATES AND VICE VERSA,
by A. Roberta Wooten. Aug 62, 23p. incl. illus. tables (Memo. rept. no. 1427; An Additament to BRL memo. rept. no. 1322, AD-255 434)
(DA proj. 503-06-011)
Unclassified report

DESCRIPTORS: *Geodetic data, *Mathematical computer data, *Transformations (Mathematics), Matrix algebra, Mapping, Partial differential equations, Coding.

The transformation of geodetic ellipsoidal coordinates into Cartesian coordinates and vice versa was programmed. This analysis enlarged the programs to compute a transformation matrix T sub phi and 1/T sub phi. (Author)

3. CHEMICAL WARFARE EQUIPMENT AND MATERIALS

AD-288 745 Div. 3, 4
(TISTM/TCG) OTS price $1.10

Naval Ammunition Depot, Crane, Ind.
CHEMICAL ANALYSIS OF RED SMOKE MIXTURE FOR VISIBILITY INVESTIGATION OF SMOKES AND FLARES,
by James McGriffin. 12 July 62, 6p. (Rept. no. RDTR 26)
Unclassified report

DESCRIPTORS: *Smokes, *Flares, *Chemical analysis, *Spectrographic analysis, Potassium compounds, Sodium compounds, Chlorates, Sucrose.

AD-288 746 Div. 3, 4
(TISTM/TCG) OTS price $1.10

Naval Ammunition Depot, Crane, Ind.
CHEMICAL ANALYSIS OF A TYPICAL 6-6-8 PYROTECHNIC STARTER COMPOSITION,
by William Ripley. 13 July 62, 8p. (Rept. no. RDTR 27)
Unclassified report

DESCRIPTORS: *Pyrotechnics, *Silicon, *Lead compounds, *Copper compounds, *Oxides, *Quantitative analysis, Chemical analysis, Electrodeposition.

AD-289 445 Div. 3
(TISTW/RD) OTS price $3.60

Naval Ammunition Depot, Crane, Ind.
SAFETY MANUAL. THE LABORATORY PREPARATION OF PYROTECHNICS,
by Carl Armour. 27 July 62, 26p. (RDTR rept. no. 29)
Unclassified report

DESCRIPTORS: *Pyrotechnics, Hazards, Chemicals, Sensitivity, Colored smokes, Flares, Delay elements, Igniters, Safety.

AD-289 502 Div. 3, 22
(TISTP/TL) OTS price $1.60

Booz-Allen Applied Research, Inc., Chicago, Ill.
APPLIED CW MATHEMATICAL AND STATISTICAL RESEARCH. Quarterly progress rept. no. 1, 19 June-30 Sep 62. 29 Oct 62, 17p.
(Contract DA 18-108-cml-7174)
Unclassified report

DESCRIPTORS: *Chemical warfare, *Statistical distribution, *Casualties, *Fragmentation, Probability, Statistical functions, Tables, Data, Sampling.

4. CHEMISTRY

AD-287 903 Div. 4
(TISTM/ODN) OTS price $1.60

Naval Radiological Defense Lab., San Francisco, Calif.
SOLUTE DISTRIBUTION IN THE Na2O-B2O3-NaCl SYSTEM. I. ALKALI METALS,
by M. H. Rowell. 9 Oct 62, 20p. incl. illus. 16 refs. (Rept. no. NRDL-TR-588)
Unclassified report

DESCRIPTORS: *Inorganic substances, *Phase studies, Oxides, Borates, Chlorides, Phase transitions, Sodium compounds, Cesium compounds, Rubidium compounds, Ions, Salts, Solvent extraction, Alkali metals, Distribution, Boron compounds, Glass, Solubility, Structures, High temperature research.

The distribution of trace amounts of Cs and Rb between immiscible liquid phases over a wide composition range in the system Na2O-B2O3-NaCl at 830 C was studied by means of Cs-137 and Rb-86. Phase diagram data and distribution coefficients of the solutes were obtained during these equilibrations. The distribution of solutes is presented as a function of the compositions of the two conjugate phases. At low Na2O content in the system the borate/salt distribution coefficients have the order Cs > Rb > Na, but at high Na2O content the order is reversed. Other solutes such as Ca show a greater variation of distribution coefficient with phase composition than do alkali metals. An explanation of solute distribution is offered on the basis of changing borate network structure and the formation of ion exchange sites therein. (Author)

AD-287 948 Div. 4, 17
(TISTM/ODN) OTS price $2.60

Aeroelastic and Structures Research Lab., Mass. Inst. of Tech., Cambridge.
PREPARATION OF IDEALIZED TWO PHASE COMPOSITES BY ELECTROPLATING,
by R. H. Krock, G. Levy, and L. A. Shepard. Aug 62, 15p. incl. illus. 6 refs. (Rept. no. ASRL TR 94-2)
(Contract AF 49(638)775, Proj. 9782)
Unclassified report

DESCRIPTORS: *Composite materials, *Silver, *Steel, *Electroplating, Ball bearings, Microstructure, Sintering, Grains (Metallurgy), Particles, Phase studies, Preparation, Electroplating solutions.

Two phase composites, whose microstructure consists of steel ball bearings uniformly dispersed in Ag matrix, were prepared by electroplating. Sintering of the composite raft after electroplating removed remaining voids and removed boundaries between particles by grain growth and diffusion. This method is capable of producing a two phase composite with careful control of particle size and interparticle spacing, unobtainable by previous methods. (Author)

AD-288 018 Div. 4, 25
(TISTM/EJH) OTS price $4.60

Hammersmith Hospital, London (Gt. Brit.).
OPTICAL ROTATORY DISPERSION OF ORGANIC COMPOUNDS.
Final technical rept. no. 3, 1 May 60-30 Sep 62,
by W. Klyne. 20 Oct 62, 43p. incl. illus. tables, refs.
(Contract DA 91-591-EUC-1446)
Unclassified report

DESCRIPTORS: *Ketones, *Carbonyl radicals, *Organic compounds, *Molecular structures, *Stereochemistry, Steroids, Carboxylic acids, Amino acids, Alkaloids, Sulfoxides, Antigens, Molecular rotation, Configuration, Molecules.

Contents:
Saturated ketones: six-membered rings
Saturated ketones: five-membered rings
Side-chain ketones
Non-ketonic steroids
Alpha-hydroxy-alpha-phenyl carboxylic acids
Alpha-aminoacids and related compounds
Miscellaneous simple compounds with one or two centers of asymmetry
Lignans
Alkaloids
Sulfoxides

AD-288 075 Div. 4, 14
(TISTM/TCG) OTS price $1.25

National Carbon Co., Inc., Cleveland, Ohio.
RESEARCH AND DEVELOPMENT ON ADVANCED GRAPHITE MATERIALS. VOLUME X. THERMAL REACTIVITY OF AROMATIC HYDROCARBONS.
Final rept. on Refractory Inorganic Non-Metallic Materials,
by I. C. Lewis and T. Edstrom. Aug 62, 41p. incl. illus. tables, 21 refs.
(Contract AF 33(616)6915, Proj. nos. 7350, 7381, and 7-817)
(WADD TR 61-72, vol. 10) Unclassified report

DESCRIPTORS: *Organic compounds, *Hydrocarbons, *Graphite, Pyrolysis, Chemical reactions, Carbon, Condensation, Absorption, Spectrographic analysis, Electron transitions, Spin, Resonance, Chromatographic analysis, Molecular weight, Chemical properties.

A general survey is given of the thermal reactivity of aromatic hydrocarbons to provide information basic to the understanding of the conversion of organic materials to carbon. Differential thermal analysis was employed on 84 aromatic hydrocarbons to delineate the thermal sequences during pyrolysis to 750 C. Absorption spectra, electron spin resonance, chromatography, and molecular weight determinations were used to determine the mechanisms and structural changes which occur. (Author)

AD-288 210 Div. 4, 25, 8
(TISTM/EJH) OTS price $3.60

Electro-Optical Systems, Inc., Pasadena, Calif.
RESEARCH AND INVESTIGATION OF MATERIALS FOR LASER APPLICATIONS.
Interim engineering rept. for 1 Aug-31 Oct 62, 15 Nov 62, 35p. incl. illus. tables (EOS rept. no. 3110-Q-2)
(Contract AF 33(657)8918)
Unclassified report

DESCRIPTORS: *Lasers, *Chelate compounds, *Metalorganic compounds, *Rare earth compounds, *Rare earth elements, Synthesis, Fluorescence, Luminescent materials, Luminescence, Ethyl radicals, Acetyl radicals, Acetates, Absorption, Ultraviolet spectroscopy, Glass, Silicon compounds, Dioxides, Fluorides, Plastics, Tests, Materials.

Various rare earth chelates, organic compounds, and other materials suitable for laser application were synthesized. The relevant parameters like the absorption and fluorescence spectra, the fluorescence decay time, fluorescence efficiency, photo and thermal stability are being evaluated. Some of the promising materials were tested for laser action. No laser action was observed in these materials. Neodymium ethylacetoacetate

was synthesized, and exhibited a fluorescence of high intensity. From a survey of different glasses as host material, it was found that the rare earth introduced as a fluoride and in a high temperature, high silicate glass gives the highest fluorescence and longest decay times. (Author)

AD-288 573 Div. 4, 25
(TISTM/TCG) OTS price $2.60

Imperial Coll. of Science and Tech., London (Gt. Brit.).
PHOTOCHEMICAL REACTIONS IN THE ALKALI HALIDES,
by P. W. M. Jacobs and Lina Ben-Dor. Oct 62, 13p. illus. 4 refs. (Technical rept. no. 1)
(Contract N62558-2862, Proj. NR 018-707)
Unclassified report

DESCRIPTORS: *Alkali metals, *Halides, *Potassium compounds, *Chlorides, *Silver compounds, Crystals, Single crystals, Photochemical reactions, Photolysis, Decomposition, Theory, Gases, Chemical reactions, Chlorine, Hydrogen, Hydroxides, Silicon compounds, Oxides, Mercury.

The rates of gas evolution from KCl in the form of fine crystals, ground powder and single crystals of varying purity were measured and the quantum yields evaluated. Comparative experiments using AgCl showed that the gaseous products from two substances are identical but that, although containing Cl, they consist largely of H. A mechanism involving the exchange of Cl with H in the OH - groups of the hydrated silica forming the interior surface of the glass walls is proposed to account for this. Measurements of the rates of gas evolution with and without a water filter confirmed that a substantial amount of the reaction is caused by the 2537 Angstroms Hg resonance line. Possible mechanisms for the photolysis are discussed. (Author)

AD-288 587 Div. 4
(TISTB/MS) OTS price $1.10

Yale U., New Haven, Conn.
THEORY OF PRESSURE SHIFTS OF HCl LINES CAUSED BY NOBLE GASES,
by H. Margenau and H. C. Jacobson. Aug 61, 5p. incl. table, 2 refs.
(Contract AF 18(603)15)
Unclassified report

DESCRIPTORS: *Physical chemistry, *Gases, *Kinetic theory, Hydrochloric acid, Pressure.

AD-288 590 Div. 4, 14
(TISTM/EJH) OTS price $4.60

Mellon Inst. of Industrial Research, Pittsburgh, Pa.
(No title).
Technical rept. no. 8, 1 Mar-31 Aug 62.
31 Aug 62, 1v. incl. illus. tables, refs.
(Contract Nonr-269300)
Unclassified report

DESCRIPTORS: *Polymers, *Styrenes, *Elastomers, Ethylenes, Oxides, Chlorides, Methyl radicals, Molecular structure, Viscosity, Elasticity, Polymerization, Test equipment, Creep, Mechanical properties, Synthesis.

Contents:
Intermediates for the preparation of comb-type polymers
Molecular structure and the viscoelastic properties of elastomers
Characterization of structure of tetra-chain star-type polystyrene
Solution versus bulk viscosity for branched polystyrene
Dimensions of polymer chains
Forced oscillation torsion pendulum

AD-288 591 Div. 4
(TISTM/EJH) OTS price $1.60

Tulane U., New Orleans, La.
REACTION OF HCl AND HBr WITH COPPER(II) - 8 - QUINOLINOL COMPLEXES,
by James C. Fanning and Hans B. Jonassen.
18 Oct 62, 11p. tables, 3 refs. (Status rept. no. 6)
(Contract Nonr-47509, Proj. NR 052-424)
Unclassified report

DESCRIPTORS: *Copper compounds, *Quinolinol, *Complex compounds, *Metalorganic compounds, Hydrogen compounds, Bromides, Chlorides, Gases, Molecular structure, Infrared spectroscopy, Magnetic susceptibility, Decomposition, Chelate compounds, Chemical properties, Synthesis.

Various copper (II)-8-quinolinol (qn) complexes were reacted with anhydrous HCl and HBr. Cu(qn)2.4HCl, Cu(qn)2.6HCl, Cu(qn)Cl.2HCl, Cu(qn)Br.2HCl, Cu(qn)2.4HBr, Cu(qn)Cl.2HBr, and Cu(qn)Br.2HBr were prepared. The infrared spectra, magnetic susceptibilities, and decomposition points were measured. These properties are used to explain the structure of the addition compounds. (Author)

AD-288 641 Div. 4, 14
(TISTM/ODN) OTS price $.50

Coating and Chemical Lab., Aberdeen Proving Ground, Md.
THE IDENTIFICATION OF POLYOLS IN SYNTHETIC COATING RESINS BY PROGRAMMED TEMPERATURE GAS CHROMATOGRAPHY, PART 2,
by G. G. Esposito. 10 May 62, 11p. incl. illus. table, 1 ref. (Rept no. CCL 120)
(Proj. 593-32-006)
Unclassified report

DESCRIPTORS: *Chromatographic analysis, *Alcohols, Gases, Esters, Polymers, Glycols, Propanes, Ethylenes, Butanols, Methyl radicals, Resins, Mannitols, Acetates, Amines, Butyl radicals, Benzyl radicals.

A recently published technique for the identification of polyhydric alcohols in coating resins by the use of programmed temperature gas-liquid chromatography is expanded to include four additional polyols encountered in new polyesters. The use of alternate amine reagents is explained and illustrated. (Author)

AD-288 767 Div. 4
(TISTM/TCG) OTS price $8.60

Ohio State U., Columbus.
A STUDY OF ANION EXCHANGE SEPARATIONS OF METALS WITH TARTARIC ACID.
Master's thesis,
by Gerald F. Pitstick. 1962, 93p.
Unclassified report

DESCRIPTORS: *Ion exchange, *Separation, *Metals, *Radioactive isotopes, Tartrates, Acids, Copper, Zinc, Iron, Chemical analysis.

AD-288 787 Div. 4
(TISTM/TCG) OTS price $1.10

University Coll., Dublin (Eire).
(No title).
Annual rept. no. 3,
by D. A. Brown, H. Sloan and others. 1962, 7p.
(Contract N62558-2381)
Unclassified report

DESCRIPTORS: *Metalorganic compounds, *Carbonyl radicals, *Chromium compounds, *Complex compounds, Molecular rotation, Atomic orbitals, Solvent action, Electron transitions, Reaction kinetics, Stereochemistry.

AD-288 788 Div. 4
(TISTM/ODN) OTS price $1.10

Los Angeles State Coll., Calif.
THE SYNTHESIS OF B4CnH2n+4 COMPOUNDS FROM PENTABORANE-9 AND ALKYNES CATALYZED BY 2,6-DIMETHYLPYRIDINE,
by Thomas P. Onak, Robert E. Williams, and Harold G. Weiss. 1 Aug 62, 5p.
(Contract Nonr-336400)
Unclassified report

DESCRIPTORS: *Boron compounds, *Carbon compounds, *Hydrogen compounds, Hydrides, Catalysts, Acetylenes, Pyridines, Methyl radicals, Synthesis.

AD-288 830 Div. 4
(TISTM/ODN) OTS price $1.60

Stanford Research Inst., Menlo Park, Calif.
VAPOR PRESSURE OF AMMONIUM PERCHLORATE,
by S. Henry Inami, Willis A. Rosser and Henry Wise. 1962, 13p. incl. illus. tables.
(Sponsored by Office of Naval Research)
Unclassified report

DESCRIPTORS: *Ammonium radicals, *Perchlorates, Vapor pressure, Thermodynamics, Dissociation, Sublimation, Entropy.

The equilibrium vapor pressure of NH_4ClO_4 was measured in the temperature range of 520-620 K by the transpiration method. The data indicate that NH_4ClO_4 sublimes by the dissociation process $NH_4ClO_4(s) = NH_3(g) + HClO_4(g)$. The heat of dissociation was found to be 58 ± 2 kcal/mole in the cited temperature range. (Author)

AD-288 920 Div. 4, 25
(TISTM/ODN) OTS price $1.50

Armour Research Foundation, Chicago, Ill.
A STUDY OF FREE RADICALS AND OTHER INTERMEDIATE SPECIES AND INTERNAL ENERGY TRANSFER PROCESSES IN IRRADIATED CHEMICAL SYSTEMS.
Final rept., 15 Sep 60-14 Mar 62 on the Chemistry and Physics of Materials,
by P. Y. Feng and B. K. Krotoszynski. Sep 62, 45p. incl. illus. tables, 20 refs.
(Contract AF 33(616)7587, Proj. 7360)
(ASD TDR 62-540) Unclassified report

DESCRIPTORS: *Free radicals, *Organic compounds, Internal conversion, Octanes, Iodides, Alkyl radicals, Chemical bonds, Hydrogen, Electrons, Gamma rays, Iodine, Hydrogen compounds, Chemical reactions.

The role of internal energy transfer processes in radiation chemical reactions involving free radicals and other intermediate species, using a series of alkyl iodides with different carbon chain lengths as the experimental systems is studied. It was found that, (1) with increasing size of the alkyl group in a homologous series, the extent of C-I bond rupture decreases regularly, whereas both the H2 and HI yields increase; (2) products with practically identical yields are formed in the radiolyses of two systems with similar elemental compositions, one consisting of pure C16H33I, and the other an equimolecular mixture of C8H18 and C8H17I. Analysis of these results, shows that energy initially localized elsewhere in an alkyl iodide molecule cannot efficiently cause C-I bond breakage despite the latter's low bond strength, i.e., internal energy transfer does not play an important role in these reactions. Instead, it is concluded that the product yields are dependent on the effective electron fractions of the various groups in the irradiated system. (Author)

AD-288 925 Div. 4, 14
(TISTM/ODN) OTS price $1.60

Aerospace Corp., El Segundo, Calif.
ENERGY CONVERSION RESEARCH PROGRAM. ELECTRICAL PROPERTIES OF ORGANIC COMPOUNDS.
Semiannual technical rept., 1 Jan-30 June 62,
by H. H. Takimoto, L. O. Krbechek and others. 31 July 62, 10p. 4 refs. (Rept. no. TDR 69(2220-20)TR-2)
(Contract AF 04(695)69)
(DCAS TDR 62-166) Unclassified report

DESCRIPTORS: *Organic compounds, *Anthrones, Chemical reactions, Preparation, Sulfonyl radicals, Methanes, Cyano radicals, Anthracenes, Synthesis, Nitriles, Phosphorous compounds, Chlorides, Heterocyclic compounds, Dioxides, Ethylenes, Quinones, Hydrolysis, Fluorides, Electrical properties.

The investigation concerned the mechanism of the electronic conduction process in organic compounds to provide data for development of new solid-state and energy conversion concepts. Several methods were studied for the preparation of organonitrile compounds whose derivatives may exhibit relatively high conductivities. This led to an interesting and unusual reaction involving anthrone, thionyl chloride and malononitrile resulting in formation of the heretofore unreported 10-dicyanomethyleneanthrone. (Author)

AD-288 939 Div. 4
(TISTM/EJH) OTS price $5.60

Harvard U., Cambridge, Mass.
THE ATTRACTIVE FORCES BETWEEN LONG SATURATED CHAINS AT SHORT DISTANCES,
by Lionel Salem. 1962 51p. incl. illus. tables, 82 refs.
(Sponsored by Office of Naval Research)
Unclassified report

DESCRIPTORS: *Molecules, *Hydrocarbons, *Quantum mechanics, *Chemical bonds, Electrons, Films, Crystals, Lattices, Energy, Mathematical analysis.

The assumption of locally additive forces is used to describe the London-Van der Waals dispersion attraction between long saturated chains at distances small in comparison with their length. A formula for the total dispersion energy is presented for two linear chains of length L, opposed and parallel, each built out of N identical units of length. At distances D (mutual distance of the 2 chains) much smaller than the molecular length L the energy becomes proportional to L (or N) and inversely proportional to the fifth power of the intermolecular distance. The coefficient A is calculated for the interaction between two CH2 units in hydrocarbon chains and the result is used to esti-

mate the sublimation energy at 0 K of paraffin crystals. Sound agreement with experiment was obtained. Particularities of the attractive forces between long saturated chains are examined in detail and their great sensitivity to distance is shown. Various applications to systems of biological interest are suggested. (Author)

AD-289 005 Div. 4, 17
(TISTM/EJH) OTS price $1.60

Rensselaer Polytechnic Inst., Troy, N. Y.
CORROSION STUDIES IN MOLTEN ALKALI CARBONATES. PART I. SILVER METAL.
by G. J. Janz and E. Neuenschwander. Oct 62, 16p. incl. illus. tables, 12 refs. (Technical rept. no. 16)
(Contract Nonr-59110)
Unclassified report

DESCRIPTORS: *Silver, *Corrosion, *Alkali metal compounds, *Carbonates, Salts, Lithium compounds, Sodium compounds, Potassium compounds, Eutectics, Melting, Solubility, Thermodynamics, High temperature research, Ions.

The corrosion of Ag in the molten ternary eutectic mixture of Li2CO3, Na2CO3 and K2CO3 over the 600-900 C temperature range was investigated by the weight loss technique. A limited but finite Ag solubility is noted for non-faradaic or no-electrical-load type measurements. With an anodic current imposed, a solubility of Ag that correlates well with the faradaic predictions is found. The thermodynamic method is applied to predict the saturation solubility of Ag+ ions in carbonate melts. While the assumption of solution of Ag as the non-oxidized metal is not ruled out, the view is advanced that dissolution observed on the non-faradaic corrosion experiments is most probably due to the presence of an oxidizing agent, such as oxygen, dissolved in small amounts in the molten carbonates. (Author)

AD-289 022 Div. 4
(TISTM/TCG) OTS price $1.10

Brandeis U., Waltham, Mass.
MECHANISM OF ELECTROPHILIC SUBSTITUTION OF FERROCENES.
Final rept.,
by Myron Rosenblum. 24 Oct 62, 2p. incl. tables.
(Grant DA-ARO (D)-31-124-G108)
(AROD rept. no. 3064:4)
Unclassified report

DESCRIPTORS: *Ferrocenes, *Metalorganic compounds, Methyl radicals, Ethylenes, Chemical reactions, Acetylation, Stereochemistry, Catalysts, Aluminum compounds, Chlorides, Vapors, Chemical analysis, Substitution reactions.

Two mechanisms by which metallocenes undergo electrophilic substitution will be considered. The first, exocyclic attack of the electrophilic reagent upon the formally unsaturated rings, is in principle a mechanism analogous to that pertaining to benzenoid systems. The second mechanism invokes the metal atom itself as the initial site of electrophilic attack. Subsequent rearrangement of this intermediate, involving encocyclic attack, leads eventually to the substituted ferrocene. Attempts were made to distinguish between these two courses of reaction by conducting acylation reactions on a series of bridged ferrocenes which offered varying degrees of steric occlusion at the metal atom. Vapor phase analysis of the acyl isomers formed in the course of AlCl3 catalyzed i-butyrylation of ferrocene gave the data for the ratio of 3 to 2 substitution. (Author)

AD-289 024 Div. 4, 7
(TISTM/TCG) OTS price $1.75

Battelle Memorial Inst., Columbus, Ohio.
RESEARCH ON THE ELECTROLYSIS OF WATER WITH A HYDROGEN-DIFFUSION CATHODE TO BE USED IN A ROTATING CELL.
Final rept., 1 June 61-31 May 62 on Equipment for Life Support in Aerospace,
by John Clifford and Charles Faust. Aug 62, 61p. incl. illus. tables, 39 refs.
(Contract AF 33(616)8431, Proj. 6373)
(AMRL TDR 62-94) Unclassified report

DESCRIPTORS: *Water, *Electrolysis, *Hydrogen, *Cathodes (Electrolytic cell), *Oxygen, Chemical reactions, Weightlessness, Cathodes, Palladium alloys, Silver alloys, Electrolytes, Anodes (Electrolytic cell), Foils, Design, Potassium compounds, Hydroxides, Transport properties, Diffusion, Synthesis.

It is shown that the concept of a H-diffusion cathode is technically feasible for potential use in a water-electrolysis cell for production of breathing O under weightless conditions. The best result was a cathode current density of 265 amp/sq ft at a cell voltage of 1.76 v while maintaining for about 1 hour 100% transmission of H through a cathode of Pd-Ag alloy foil (3/8-inch diameter x 0.001-inch thickness). The pure, dry H gas that permeated the cathode foil was collected at atmospheric pressure during electrolysis of a KOH electrolyte (50 wt-% KOH) at 230 C and 15 to 25 psig in a Teflon-lined cell with a Pt anode. The laboratory experiments with a stationary cell indicated the importance of designing for minimum electrolyte contamination and the need for further study of activation of the cathode foil. To supply breathing O for 3 men (6 lb of O/day), preliminary design estimates for a rotating cell (to provide an artificial gravity field for separation of O from the anode and electrolyte) indicate an electrolysis cell (exclusive of motor, controls, etc.) of 4-3/4-inch diameter x 4-3/4-inch height, weighing about 10 lb and consuming an electrolysis power of 670 w. (Author)

AD-289 067 Div. 4, 25
(TISTM/BRW) OTS price $2.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
MAGNETIC AND ELECTRICAL PROPERTIES OF THE ALKALI AND ALKALINE EARTH METALS.
Interim technical rept.,
by E. W. Collings, P. J. Flanders, and F. T. Hedgcock. 31 Aug 62, 26p. incl. illus. table, 6 refs. (Rept. no. I-B1900-1)
(Contract Nonr-364400, Proj. NR 039-077)
Unclassified report

DESCRIPTORS: *Alkali metals, *Alkaline earth metals, Magnetic properties, Electrical properties, Ferromagnetic materials, Magnetic susceptibility, Paramagnetic resonance, Low temperature research, Sodium, Potassium, Lithium, Magnetometers, Test equipment, Temperature, Pressure.

Progress is reported on (1) the necessary low temperature apparatus and (2) the vibrating sample magnetometer to be used for pressure studies. Eddy current problems still have to be solved, as do methods for pressurizing the alkali metal. It is shown that distillation techniques are quite useful in reducing the ferromagnetic component in the total susceptibility of the alkali metals. This should permit more reliable values of the magnetic susceptibility to be determined and also

provide the pure samples required for measurements of the change of susceptibility on meltings and on transformation at low temperatures. (Author)

AD-289 206 Div. 4, 10
(TISTM/ODN) OTS price $1.60

Rocket Power, Inc., Pasadena, Calif.
STUDY OF ROCKET ENGINE EXHAUST PRODUCTS,
Quarterly rept. no. 5, 1 June-31 Aug 62,
by M. A. Greenbaum, H. Petersen and others.
31 Aug 62, 15p. incl. illus. table, 13 refs.
(Contract AF 04(611)7414)
Unclassified report

DESCRIPTORS: *Beryllium compounds, *Solid rocket propellants, Thermodynamics, Oxides, Fluorides, Enthalpy, Entropy, Heat of formation, Gases, Chemical equilibrium, Test equipment, Determination, Thermochemistry, Exhaust gases.

The reaction BeO(s) + 2HF(g) yields BeF2(g) + H20 was employed to obtain values for the delta H sub f(298) and S(298) of BeF2(g). The experimentally determined values for delta H sub r and delta S sub r for the above reactions over the temperature range 943-1243 K are 20.5 ± 1.7 kcal and 6.0 ± 0.3 cal/deg/mole respectively. From these values and available thermodynamic data on all the species of interest, the Second Law values for delta H sub f(298) and S(298) of BeF2(g) were found to be -191.3 ± 2.0 kcal/mole and 52.4 ± 0.3 cal/deg/mole respectively. The Third Law delta H sub f(298) for BeF2(g) was determined to be -191.2 ± 0.4 kcal/mole. (Author)

AD-289 213 Div. 4
(TISTM/ODN) OTS price $4.60

Electrochemistry Research Lab., Western Reserve U., Cleveland, Ohio.
THE ELECTROCHEMISTRY OF NICKEL. II. ANODIC POLARIZATION OF NICKEL,
by M. L. Kronenberg, J. C. Banter, and others.
15 Oct 62, 42p. incl. illus. table, 19 refs.
(Technical rept. no. 15)
(Contract Nonr-239100, Proj. NR 359-277)
Unclassified report

DESCRIPTORS: *Electrochemistry, *Nickel, Chlorides, Sulfates, Perchlorates, Solutions, Nickel electrodes, Ions, Hydrogen ion concentration, Polarization, Electric potential Density, Anodes, Cathodes, Electrolysis, Solubility, Electrolytes, Single crystals (Metallurgy), Test equipment, Acids.

The anodic dissolution of Ni was studied in acidified chloride, sulfate, and perchlorate solutions under a variety of non-passivating conditions. The Tafel slopes at 45 C are approximately 0.085, 0.115, 0.12, respectively. The lower value of the Tafel slope in chloride solutions is attributed to specific adsorption. The potential of the Ni anode is independent of Ni(++) concentration under conditions for which the back reaction is negligible and no pH dependence has been found for pH of 1 to 2.5. The temperature dependence of the polarization yields an approximate value of 15 kcal/mole for the heat of activation in the chloride solution. (Author)

AD-289 270 Div. 4, 32
(TISTM/ODN) OTS price $1.60

Hydrogen Peroxide Labs., Mass. Inst. of Tech., Cambridge.
PROPERTIES AND REACTIONS OF HYDROGEN PEROXIDE.
Final rept.,
by Charles N. Satterfield. 15 May 62, 12p.
(Contracts Nonr-184111, Proj. NR-092-008 and N5ori-07819)
Unclassified report

DESCRIPTORS: *Hydrogen, *Peroxides, *Bibliography, Decomposition, Stability, Chemical reactions, Catalysis, Combustion, Thermodynamics, Physical properties, Chemical properties, Reaction kinetics.

This report lists references of research studies on the properties and reactions of H202 carried out at the Massachusetts Institute of Technology during the period 1945 - 1962. (Author)

AD-289 327 Div. 4
(TISTM/EJH) OTS price $3.60

Noyes Chemical Lab., U. of Illinois, Urbana.
NUCLEAR SPIN RELAXATION IN LIQUID CHFC12,
by R. J. C. Brown, H. S. Gutowsky, and K. Shimomura. 14 Aug 62, 32p. incl. illus. 35 refs. (Technical rept. no. 57)
(Contract Nonr-183413, Proj. NR 051-215)
Unclassified report

DESCRIPTORS: *Methanes, *Nuclear spins, *Relaxation time, Molecules, Chlorine compounds, Fluorides, Liquids, Dipole moments, Mathematical analysis, Low temperature research, Molecular rotation.

Nuclear spin relaxation times were measured for liquid CHFC12. The following relaxation mechanisms are shown to be important: (1) intermolecular dipole-dipole interactions, including their effect upon the electronic, scalar coupling of the proton and F nucleus, (2) the quadrupolar relaxation of the Cl nuclei, which are coupled to the proton and the F nucleus by scalar couplings, and (3) the spin-rotation interaction between the F nucleus and the reorientation of the molecule. The statistical assumptions of rotational Brownian motion of the molecule, in the liquid, when applied to the spin-rotation interaction, are found to predict the wrong temperature dependence of T sub 1F at high temperatures. A model is proposed in which the molecules jump from one orientation to another at random times; the spin-rotation interaction is assumed to operate during these jumps when the molecule is actually rotating. The statistical properties of such a model are calculated, and it is shown that T sub 1F is predicted to have the correct temperature dependence. Other topics include dipole-dipole and quadrupole interactions, and intermolecular dipole-dipole relaxation by Redfield's method. (Author)

AD-289 329 Div. 4
(TISTM/EJH) OTS price $2.60

Noyes Chemical Lab., U. of Illinois, Urbana.
VALENCE BOND STUDIES OF INTERNUCLEAR COUPLING,
by H. S. Gutowsky and Cynthia Juan. 30 June 62, 27p. incl. illus. tables, 30 refs. (Technical rept. no. 55)
(Contract Nonr-183413, Proj. NR 051-215)
Unclassified report

DESCRIPTORS: *Chemical bonds, *Valence, *Hydrocarbons, Polycyclic compounds, Carbon, Hydrogen, Atoms, Protons, Spectrographic analysis, Isotopes.

Proton spectra for the -CH2CH2- bridges in (2.2) metacyclophane, show conclusively that the relative signs of the geminal and vicinal proton coupling constants are opposite, which disagrees with the theoretical prediction that both are

positive. In this compound, the C-CH2-CH2-C groups are locked in position with the dihedral angle between alkyl C-C-C bonds slightly less than the symmetrical, staggered 60 degree. A related study was concerned with an interpretation for the additivity of substituent contributions to the C-13-H coupling constant. Each atom or group X is assigned a characteristic ''affinity'' for s character in the C hybrid orbital of the C-X bond. The additivity can be derived if the s character is distributed among the 4 C orbitals in accord with the relative s affinities of the 4 substituents, provided that the total s character is conserved. The valence bond approach used with this model gives a linear relation between the s character of the carbon hybrid orbital involved in a C-H bond and the observed C-13-H coupling constant. (Author)

AD-289 332 Div. 4
(TISTM/ODN) OTS price $2.60

Royal Inst. of Tech. (Sweden).
HYDROLYSIS EQUILIBRIA OF CATIONS AND ANIONS.
Final technical rept., 1 Oct 58-30 Sep 62,
by Lars Gunnar Sillen. 6 Oct 62, 21p. refs.
(Contract AF 61(052)162)
Unclassified report

DESCRIPTORS: *Ions, *Complex ions, Crystal structure, Scientific reports, Least squares method, Computers, Thermochemistry, Solutions, Chromates, Tungstates, Molybdates, Transition elements, Alkaline earth metals, Alkali metals, Fluorides, Rare earth elements, Chemical equilibrium, Chemical analysis, Hydrolysis.

This report on hydrolysis equilibria of cations and anions summarizes 26 technical notes that have been published as articles in scientific journals, and in addition 25 future papers that have been practically completed. Crystal structure analyses on oxo- and hydroxo-compounds of Cr, Fe, Al, In, Ge, Te, Zr, Th, V, Co, Ni, Zn, Ga, Sn and Pb were achieved. The existence of discrete groups Al2(OH)2(H2O)8(4+) and Al13O4(OH)24(H2O)6(7+) was proved and their structures determined. For compounds of Ge, Sn and Pb, illustrations for the solution equilibria were found. The treatment of data in complicated systems was greatly aided by a generalized least-squares program for high-speed computers. For thermochemical studies, an automatic recording calorimeter for enthalpy titrations was constructed, and a special general least-squares program worked out. Results are given for the Br(-)-Hg(2+) system but data on many more systems are available. (Author)

AD-289 556 Div. 4
(TISTM/EJH) OTS price $3.60

Ohio State U. Research Foundation, Columbus.
THE METAL COMPLEXES OF POLYFUNCTIONAL 2-AMINOTHIOLS.
Comprehensive technical rept., 1 Oct 60-1 Oct 62,
by Daryle H. Busch. 12 Nov 62, 39p. incl. illus. tables, 19 refs.
(Contract DA 49-193-md-2104)
Unclassified report

DESCRIPTORS: *Complex compounds, *Thiols, *Amines, *Pyridines, *Metalorganic compounds, *Chelate compounds, Synthesis, Chemical properties, Physical properties, Molecular structure, Stability, Isomer, Nickel compounds, Cobalt compounds, Palladium compounds, Magnetic moments.

Complexes of N-alkyl and N,N-dialkyl-beta-mercaptoethylamines, polymercapto-ethylamines, and 2-mercaptoalkylpyridines were investigated. In general, the properties of complexes derived from mercaptoamines are broadly variable. Some ligands of this class produce highly crystalline metal derivatives that are readily handled and characterized. Others yield intractable materials of extremely low solubility in all solvents and discouraging physical form. It appears that the presence of uncoordinated mercaptoethyl functions leads to poor shelf stability, air sensitivity, and general intractability. New N-alkyl and N,N-dialkyl-beta-mercaptoethylamines were prepared and their characterization is proceeding. The metal complexes of mercaptoalkylpyridine ligands tend to be only very slightly soluble and to separate from solution in forms that are difficult to handle. Characterization of the new compounds is as complete as their physical properties will permit and the results are presented. (Author)

5. COMMUNICATIONS

AD-288 076 Div. 5
(TISTW/RD) OTS price $4.00

Dynatronics, Inc., Orlando, Fla.
ADAPTIVE TECHNIQUES FOR LONG RANGE TRANSMISSION OF PULSE CODE MODULATION TELEMETRY DATA.
Final rept., June 60-May 61,
by D. H. Ellis, J. M. Walter, Jr. and others.
Aug 62, 244p. incl. illus. tables, refs.
(Contract AF 33(616)7488, Proj. 4107)
(ASD TR 61-198) Unclassified report

DESCRIPTORS: *Telemetering data, *Data transmission systems, Pulse modulation, Coding, Telemeter systems, Design, Programming, Digital systems, Communication systems, Radio transmission, Phase modulation, Airborne.

A study and development program is described involving the application of certain techniques for long range transmission of PCM telemetry data. The objective of the program was to explore and develop those areas of PCM system design which most satisfactorily meet long range transmission and data handling requirements. The technical approach includes optimization of system information capacity, selection of an optimum R. F. link, and investigations of format compromises, to attain the maximum information rate possible over a wide range of transmission path lengths, and a variety of data requirements. The type of modulation (phase) for the R. F. link is shown by theoretical analysis to be superior to any other. A system design and engineering model development program has been completed. Results of test performed on the model verify the feasibility of the engineering design. (Author)

AD-288 143 Div. 5, 30
(TISTB/MS) OTS price $9.10

Bulova Research and Development Labs., Inc., Woodside, N. Y.
WORD-RECOGNITION SYSTEM.
Interim development rept., 2 Apr-30 Sep 62,
by Louis J. Gerstman and Herman P. Friedman.
17 Oct 62, 106p. incl. illus. tables, 17 refs.
(Rept. no. SP-1307)
(Contract NObsr-87399)
Unclassified report

DESCRIPTORS: *Reading machines, Voice communication systems, Vocabulary, Sound reproduction systems, Analog-to-digital converters, Speech.

The feasibility of transforming voice signals into a form suitable for machine recognition is being studied. The ultimate application of this work will be to update the data files of the Navy Tactical Data System in real time. The special tools available at Bulova for this research consist of an ALWAC III-E Digital Computer and an Analog-to-Digital Converter constructed with company funds. The latter device samples waveforms at 7000 cps and converts them to a binary code having six-bit accuracy either for direct computer input or for intermediate storage on punched paper tape. For this initial phase of the program the problem of automatic word recognition was seen to consist of three associated tasks: (1) the development of word sampling techniques, (2) the development of machine characterizations of the samples, and (3) the development of computer programs to analyze and recognize these characterizations. Progress was made in all three areas using for an input vocabulary the words of the Navy Phonic Alphabet. It should be noted, however, that the applicability of the results extends beyond this vocabulary to larger and different collections of words. (Author)

AD-288 247 Div. 5, 6
(TISTP/FR) OTS price $1.10

Aeronautical Electronic and Electrical Lab., Naval Air Development Center, Johnsville, Pa.
STUDY OF INTEGRATED IFF-MADATS DATA-LINK SYSTEM PROPOSED BY THE BELL AEROSYSTEMS COMPANY.
Final rept.,
by R. DeSipio and N. J. Cuadra. 1 Nov 62, 7p. incl. illus. tables (Rept. no. NADC-EL-6262)
(Weptask no. RAV04J008/2021/F001-10-01)
Unclassified report

DESCRIPTORS: *Radio interference, *Data transmission systems, *Identification systems, Radar equipment, Radio equipment, Aircraft carriers, Measurement.

The concept proposed by the Bell Aerosystems Company for a communication-data link system to determine the compatibility of the IFF data link when exposed to a congested IFF environment was studied. The proposed system offered a one-way electronic glideslope data capability when exposed to a simulated laboratory IFF environment. Proper indication of the system data-link was maintained to a total pulse repetition frequency level of 3000 with the MADATS signal 28 db stronger than the IFF interrogation signals. When the IFF interrogation signals were set 14 db stronger than the MADATS signals, the system operated to a limit of 1600 pulse repetition frequency. (Author)

AD-288 528 Div. 5
(TISTP/TL) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
APPROXIMATE CALCULATION OF THE TRAFFIC CAPACITY OF RADIO CHANNELS HAVING RANDOM PARAMETERS,
by R. L. Dobrushin, Ya. I. Khurgin and B. S. Tsybakov. 26 Sep 62, 9p. 10 refs. (Trans. no. FTD-TT-62-1016 from Trudy Vsesoyuznogo Soveshchaniya po Teorii Veroyatnostey i Matematicheskoy Satistike, Izdatel'stvo AN Armyanskoy SSR, Yerevan, pp. 164-171, 1960)
Unclassified report

DESCRIPTORS: *Radio communications systems, *Radio waves, *Medium frequency, *High frequency, Ionosphere, Wave transmission, Signal-to-noise ratio, Errors, Interference, Statistical distribution, Integration, Inequalities, Probability, Statistical processes, Communications theory, Scattering, Reflection.

AD-288 532 Div. 5
(TISTP/FR) OTS price $3.00

National Bureau of Standards, Boulder, Colo.
PERFORMANCE PREDICTIONS FOR SINGLE TROPOSPHERIC COMMUNICATION LINKS AND FOR SEVERAL LINKS IN TANDEM,
by A. P. Barsis, K. A. Norton and others.
Aug 61, 154p. incl. illus. tables, refs.
(NBS Technical note no. 102)
Unclassified report

DESCRIPTORS: *Radio communication systems, Scattering, Atmosphere, Wave transmission, Attenuation, Statistical analysis, Probability.

Performance of long-distance tropospheric communication circuits, either singly or in tandem, is predicted in terms of the probability of obtaining a specified grade of service or better for various percentages of time. The grade of service is determined by signal-to-RMS-noise for the type of intelligence to be transmitted. The standard deviation of prediction errors depends upon the percentage of hours the specified grade of service is required and on parameters characterizing the propagation path. The possibility of reducing this standard deviation by making path-loss measurements is discussed. It is shown that no improvement is possible unless the test path is very nearly the same as the proposed operational path; in particular, unless the test path and operational paths have terminals less than one mile apart it is shown to be doubtful in most cases whether the observations will be useful in improving the reliability of the predicted performance of the proposed system. Assuming that the test path and proposed operational paths are identical, estimates are given of the number of days of observations required to halve the prediction uncertainty or, alternatively, to reduce it to 3 db; in some cases several years of observations are required. (Author)

AD-288 783 Div. 5
(TISTW/RD) OTS price $7.60

Aerospace Information Div., Washington, D. C.
COMMUNICATIONS NETWORKS. REVIEW OF SOVIET LITERATURE. PART II: DESIGNATIONS AND ABBREVIATIONS.
Quarterly rept., pt. 2.
29 June 62, 70p. (AID rept. no. 62-93)
Unclassified report

DESCRIPTORS: *Communication equipment, Telephone communication systems, Remote control systems, Telegraph equipment, Multiplex transmission, Electronic equipment, Signal generators, Pulse generators, USSR.

AD-288 873 Div. 5, 8
(TISTE/OHD) OTS price $3.60

White Sands Missile Range, N. Mex.
MINIATURE ELECTROSTATIC VIDICON CAMERA,
by Thomas A. Gunn. Oct 62, 23p. incl. illus.
(Technical rept. no. SELWS-E-104)
Unclassified report

DESCRIPTORS: *Television cameras, *Miniature electronic equipment, Camera tubes, Electrostatics, Electronic circuits, Transistors, Timing circuits, Trigger circuits.

A miniature lightweight vidicon television camera was developed for closed-circuit television systems. The camera, including vidicon and control circuitry, employs only 54 transistors instead of the usual 107. The self-contained system requires only ac line voltage and a television monitor for complete operation. The picture

quality and resolution are similar to commercially available models but greatly improved because of the unique method of electrostatic deflection and focus. (Author)

AD-288 977 Div. 5
(TISTW/RD) OTS price $2.60

Aerospace Information Div., Washington, D. C.
COMMUNICATIONS NETWORKS. REVIEW OF SOVIET LITERATURE. PART I.
Rept. no. 1.
29 June 62, 19p. (AID rept. no. 62-92; Work Assignment no. 33)
Unclassified report

DESCRIPTORS: *Communication systems, *USSR, Communication equipment, Multichannel telephone systems, Telephone communication systems, High frequency, Telegraph systems.

AD-289 096 Div. 5, 8
(TISTP/FR) OTS price $11.00

National Cash Register Co., Hawthorne, Calif.
RESEARCH ON MAGNETIC ROD STORAGE AND CONTROL UNITS FOR A SWITCHING CENTRAL OFFICE.
Final progress rept., 15 Apr 61-30 Sep 62,
by D. Rork and P. Ellinger. 30 Sep 62, 134p. incl. illus. tables (Rept. no. 4)
(Contract DA 36-039-sc-87212)
Unclassified report

DESCRIPTORS: *Telephone communication systems, *Multichannel telephone systems, Multiplex transmission, Pulse modulation, Digital systems, Analog systems, Switching circuits, Memory devices, Computer logic, Telephone signals.

The system has two basic units: a central exchange and one or more remote line concentrators. Each remote line concentrator services individual phone units (subscribers). Each remote concentrator is capable of handling 60 subscriber lines with a maximum load of 15 subscribers at the same time. Communication between the remote concentrators and the central exchange is handled by a time-multiplex system consisting of 16 channels, one channel for control and the remaining 15 channels for subscriber assignment. The switching central, normally provides service for 240 subscribers. However, this number is expandable to 360 subscribers by the use of two additional remote concentrators. In addition to the normal functions of connecting calls and transferring data, the system also incorporates the following capabilities: (1) one conference circuit capable of handling a maximum of ten lines, (2) provision for priority service for a maximum of five lines per switching central, (3) one operator position for an information-only operator, (4) one circuit for wire chief (trouble shooter), (5) interlocking on all trunck calls, and (1) multiplexing and PCM. (Author)

6. DETECTION

AD-287 922 Div. 6, 19
(TISTW/RD) OTS price $2.60

Army Signal Missile Support Agency, White Sands Missile Range, N. Mex.
INVESTIGATION OF PULSE RECEIVERS IN RADAR BEACONS,
by Drew Dowling and C. R. Wise. June 62, 21p. incl. illus. 5 refs. (Technical rept. no. EID-119)
Unclassified report

DESCRIPTORS: *Radar receivers, *Radar beacons, Radar signals, Radar pulses, Detection, Simulation.

A mathematical model of a superhetrodyne receiver that employs stagger tuning to give a maximally flat response is simulated on a digital computer. The model includes provision for varying the difference in frequency that may occur between the center frequency of the receiver and the frequency of the incoming signal. The response of this simulated receiver is analyzed for various bandwidth-pulse width products and different input pulse rise times. (Author)

AD-288 028 Div. 6
(TISTW/RD) OTS price $4.60

Office of Research Administration, U. of Michigan, Ann Arbor.
ON CERTAIN STRATEGIES OF SIGNAL DETECTION USING CLIPPER CROSSCORRELATOR (SINGLE SIGNAL SIZE),
BY G. P. Patil and P. Cota. Oct 62, 37p. incl. illus. tables, 6 refs. (Technical rept. no. 128; Rept. no. 3674-1-T)
(Contract Nonr-122436)
Unclassified report

DESCRIPTORS: *Clipper circuits, *Radio signals, *Radar signals, Sequential analysis, Signal-to-noise ratio, Correlation techniques, Binomials, Radio interception, Radar interception, Statistical distributions, Probability, Detection.

The problem of signal detection is considered using clipper crosscorrelator when the signal of single size and the Gaussian noise are known exactly. Strategies are developed in order to meet the requirements dictated by the gravity of the false alarm and of the miss. Four such strategies are suggested which arise in a very natural way, and their interrelations are studied. Efficiency of the clipper crosscorrelator in relation to the usual crosscorrelator is defined and investigated in the setup as described. (Author)

AD-288 095 Div. 6, 12
(TISTW/DLW) OTS price $1.60

Aerospace Corp., El Segundo, Calif.
SPACE PHYSICS PROGRAM. SATELLITE MEASUREMENTS OF THE NEAR INFRARED BACKGROUND RADIATION FROM THE EARTH.
Semiannual technical note, 1 Jan-30 June 62,
by R. M. Friedman. 11 Sep 62, 11p. incl. illus.
(Rept. no. TDR-69(2260-52)TN-1)
(Contract AF 04(695)69)
(DCAS TDR 62-181) Unclassified report

DESCRIPTORS: *Satellite vehicles, *Antiaircraft defense systems, *Guided missiles (Surface to surface), *Infrared radiation, *Infrared detectors, *Infrared telescopes, Radiometers, Interference, Reduction, Airborne, Measurement, Test methods, Flight testing, Infrared scanning, Aerial reconnaissance, Detection, Terrain, Target recognition.

Several Air Force surveillance satellite systems designed to detect missiles by measurement of infrared radiations are currently in advanced developmental or planning stages. Before the design of these systems can be completed and transition to an operational phase begun, additional measurements must be made of the infrared background radiance levels and of the fluctuations in these levels that cause false target indications. Two simple experiments are described which will be made to bridge the gap in the required knowledge. The first experiment is designed to provide information on background

intensity, dynamic range, and possible correlations in four spectral bands. The second experiment is designed to determine the general statistical nature of the background radiance in 2.7 micron band and, in particular, to determine whether or not it makes sense to discuss its Wiener spectrum. (Author)

AD-288 148 Div. 6, 25, 2
(TISTW/DLW) OTS price $1.60

Aerospace Corp., El Segundo, Calif.
NARROW-BAND DETECTOR FOR 1460 A.
Semiannual rept., 1 Jan-30 June 62,
by J. H. Zeilenga, Jr. 27 Sep 62, 11p. incl. illus. (Rept. no. TDR 69(2260-10)TN-1)
(Contract AF 04(695)69)
(DCAS TDR 62-186) Unclassified report

DESCRIPTORS: *Photometers, *Ultraviolet detectors, *Upper atmosphere, *Meteorological instruments, Gases, Sapphires, Density, Sensitivity, Molecular structure, Measurement, Ionization chambers, Materials, Design, Ultraviolet equipment, Narrowband, Oxygen, Airborne.

The development is discussed of a narrow-band ultraviolet photometer that can be used to measure neutral molecular oxygen densities in the upper atmosphere. The results of an analysis of a suitable detector are presented which led to the decision to investigate the gas-filled, ion-chamber detector. Properties of the materials for the construction of this chamber are given. Sapphire was selected as the window material and mesitylene as the filling gas. The experimental apparatus used, the methods employed, and some calculations which indicate expected output of the mesitylene-sapphire combination are discussed. (Author)

AD-288 503 Div. 6, 2
(TISTP/FR) OTS price $3.60

Barringer Research, Ltd. (Canada).
DICON EXPERIMENTAL MEASUREMENTS.
Final rept.,
by A. R. Barringer, J. D. Crone and D. Bray.
31 Aug 62, 37p. incl. illus. 16 refs.
(Contract AF 19(628)443, Proj. 7628)
(AFCRL 62-1018) Unclassified report

DESCRIPTORS: *Hydrology, *Dielectric properties, Detection, Radio waves, Very high frequency, Pulse transmitters, Oscilloscopes, Soils, Earth.

Initial tests with a ground water detection unit indicated that changes in ground moisture content and water table produced large variations in the shape of a one microsecond pulse. This equipment was reconstructed and mounted on vehicles for a further test series under non-arid conditions. Field trials were carried out in the Toronto, Parry Sound and Collingwood areas of Ontario. These areas were selected since they represented cases of very pure surface water, clay soil and hard water, and limestone bedrock with subsequent hard water. The purpose of the test series was to correlate the results with the physical properties of the ground. (Author)

AD-288 648 Div. 6, 2
(TISTW/DLW) OTS price $2.60

General Dynamics/Astronautics, San Diego, Calif.
INFRARED HORIZON MEASUREMENTS FROM NEAR-ORBITING ALTITUDES,
by Romuald Anthony and Vern N. Smiley.
15 Aug 62, 21p. incl. illus. 2 refs. (Scientific rept. no. 2)
(Contract AF 19(604)7417, Proj. 4427)
(AFCRL 62-1001) Unclassified report

DESCRIPTORS: *Infrared radiation, *Infrared scanning, *Radiometers, Flight altitude indicators, Airborne, Water vapor, Measurement, Intensity, Flight testing, Atmosphere, Earth.

The infrared horizon was scanned from an Atlas missile during a portion of the trajectory up to 800,000 feet altitude. Data was collected with a 1/4 degree field resolution in 3.5, 4.3, 4.7, and 6.3 micron spectral regions to determine radiance gradients. The window regions of the spectrum appear full of gradients which can interfere with the definition of an infrared horizon. Both the water vapor band (6.3 microns) and the carbon dioxide band (4.3 microns) have broader gradients than the atmospheric windows. Of these, the carbon dioxide band may prove most useful, as it appears to also have a smoother gradient. (Author)

AD-288 677 Div. 6, 30
(TISTW/DLW) OTS price $1.60

Operations Evaluation Group, Office of Naval Operations, Washington, D. C.
A METHOD FOR THE THEORETICAL DETERMINATION OF THE RADAR CROSS-SECTION OF AIRCRAFT.
Interim research memorandum,
by Robert J. Budnitz. 24 Sep 62, 14p. incl. illus. 2 refs. (IRM-24)
Unclassified report

DESCRIPTORS: *Radar echo areas, *Radar reflections, Programming, Surface area, Model tests, Test facilities, Guided missiles, Theory, Digital computers, Mathematical computer data, Effectiveness, Test methods, Aircraft.

A technique is described for the theoretical determination of the radar cross-section of aircraft and missiles. The technique involves representing the gross external features of the aircraft or missile by a collection of simple shapes; next calculating manually the cross-section of each of these various shapes; and finally combining the various component cross-sections so as to arrive at the final cross-section. A modification of the technique is especially amenable to use with a modern digital computer, simply on a computer, and to consider those problems inherent in the development of an actual computer program to accomplish the computation of the radar cross-section of interest. The probable accuracy in the technique presented is estimated to be within a factor of 2 or 3, or between 3 and 5 decibels. (Author)

AD-288 763 Div. 6
(TISTM/TCG) OTS price $1.10

Raytheon Co., Bedford, Mass.
INVESTIGATION OF IMPROVED CW TECHNIQUES.
Final rept.
29 June 62, 4p. (Rept. no. BR-1850)
(Contract NOw 60-0815)
Unclassified report

DESCRIPTORS: *Radar tracking, *Doppler systems, *Doppler tracking, Flight testing, Signal-to-noise ratio, Operation, Tracking, Test methods.

AD-288 780 Div. 6
(TISTW/RD) OTS price $1.60

General Electric Co., Utica, N. Y.
COUNTERMEASURES TRANSMITTING SET AN/ALT-22(V) AND BARRAGE JAMMER QRC-139A-(T) MODIFICATIONS TO AN/ALT-6B.
Monthly progress rept. for period ending 30 June 62.
30 June 62, 10p. (LMED requisition no. 32634)
(Contract AF 33(604)38334)
Unclassified report

DESCRIPTORS: *Radar jamming, *Countermeasures, Radar transmitters, Airborne.

AD-288 960 Div. 6
(TISTW/RD) OTS price $1.10

General Electric Co., Utica, N. Y.
COUNTERMEASURES TRANSMITTING SET AN/ALT-22(V) AND BARRAGE JAMMER QRC-139A-(T). MODIFICATIONS TO AN/ALT-6B.
Monthly progress rept. for period ending 31 July 62.
31 July 62, 5p. (LMED requisition no. 32634)
(Contract AF 33(604)38334)
Unclassified report

DESCRIPTORS: *Radar jamming, *Radar transmitters, L band, Magnetrons, Waveguides, Ferrites, Airborne.

AD-289 320 Div. 6
(TISTW/RD) OTS price $3.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
AN ANALYSIS OF RADAR CROSS SECTION MEASUREMENT TECHNIQUES,
by W. P. Melling. 18 Sep 59, 29p. incl. illus. 4 refs. (Rept. no. UB-1088-P-104)
(Contract DA 30-115-ORD-739)
Unclassified report

DESCRIPTORS: *Radar echo areas, *Radar targets, *Radar ranges, Measurement, Test methods, Test facilities, Model tests.

Radar cross section is conveniently determined using a high frequency radar to observe the return from a scale model of the target. Through choice of the scale factor it is possible to utilize a test radar of convenient transmission frequency for the derivation of the radar cross section that would be observed by an operational radar of any given frequency. Furthermore, the sensitivity of cross section measurement is primarily dependent upon the ratio of the size of the operational target to the operational wavelength, and tends to be independent of the frequency of the test radar. When the target dimension-to-wavelength ratio is small (less than 5 - 10), a compact facility employing a CW test radar can provide a cross section measurement sensitivity of better than 0.01 wavelengths squared. For larger targets (with dimensions up to 100 wavelengths) a pulse radar system employing a radar to target distance of tens to hundreds of feet is capable of providing comparable sensitivity. (Author)

AD-289 532 Div. 6, 8
(TISTE/OHD) OTS price $10.10

Army Engineer Research and Development Labs., Fort Belvoir, Va.
INVESTIGATION OF ANTENNAS WITH RESPECT TO ENVIRONMENTAL DISTURBANCES IN THE NEAR FIELD (PART I),
by Friedrich W. Rohde. 6 June 62, 111p. incl. illus. (Research rept. no. 1715-RR)
Unclassified report

DESCRIPTORS: *Land mines, *Mine detectors, *Antenna radiation patterns, *Wave transmission, *Electromagnetic waves, Electromagnetic theory, Electromagnetic fields, Dipole antennas, Standing wave ratios, Microwave frequency, S band, Microwave equipment, Experimental data.

Investigations are presented of the near field of antennas in support of the problems arising in mine detection. The concept of the near field is explained in a general way, and theoretical and experimental methods to investigate the near field are discussed. Some measurements of the disturbed and undisturbed near field are described, and the results are analyzed. Experiments conducted in the minefield have shown that simplified concepts are not adequate for a satisfactory explanation of the phenomena. It was assumed that any antenna has a field of a more or less complicated structure in its near environment and that the presence of the ground and mines changes the field and the radiation properties of the antenna. These considerations led to a thorough study of antenna near fields and their variations resulting from the presence of obstacles. (Author)

7. ELECTRICAL EQUIPMENT

AD-287 938 Div. 7
(TISTM/ODN) OTS price $1.60

General Dynamics/Fort Worth, Tex.
ELECTRICAL SYSTEM - INSULATED ELECTRICAL WIRE - INVESTIGATION OF MOISTURE RESISTANCE TEST PROCEDURES.
Test data memo.,
by Weldon Young. 10 Dec 59, 16p. incl. illus. table (Rept. no. FTDM-2348)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Electric wire, *Electric insulation, Moisture, Resistance, Chlorides, Sodium compounds, Tests, Solutions.

Test setups consisted of 5 methods of checking moisture resistance characteristics of insulated wire by the use of NaCl solutions. Each setup is described in detail and evaluated by comparing the insulation resistance obtained by it with the insulation resistance obtained by the longer and more involved moisture resistance test of MIL-C-5015C. The insulation resistance of the wires was determined at the start of each test and at various intervals during the test. (Author)

AD-287 941 Div. 7
(TISTM/ODN) OTS price $3.60

General Dynamics/Fort Worth, Tex.
ELECTRICAL SYSTEM - WIRE (4-035) AND CONNECTORS (4-351 AND 4-1068) - METHODS OF IMPROVING MOISTURE RESISTANCE.
Test data memo.,
by Weldon Young. 30 Apr 59, 33p. incl. illus.
(Rept. no. FTDM-2255)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Electric wire, *Electric connectors, Electric insulation, Moisture, Resistance, Ethylenes, Fluorides, Polymers, Tests, Moistureproofing.

Methods of improving insulation resistance during moisture resistance tests were determined. Specimens consisted of 4-351 and 4-1068 connectors and various types of wires and various treatments on 4-035 wire. The insulation resistance between each wire and all other wires and shell was measured once each working day until either the test was stopped as a result of low insulation resistance or until the test had been in progress for 21 days. The insulation resistances of 4-351 and 4-1068 connectors can be improved during moisture resistance tests by wiring the specimens with either Teflon-insulated wire, wire with a Teflon outer jacket, or MIL-W-5274A wire. (Author)

AD-288 060 Div. 7
(TISTM/TCG) OTS price $1.25

Harshaw Chemical Co., Cleveland, Ohio.
RESEARCH ON A COMPOSITE ENERGY GAP PHOTOVOLTAIC CELL.
Final technical rept., June 59-May 62 on Research in Solid State Physics,
by John D. Nixon and Norman E. Heyerdahl.
Aug 62, 39p. incl. illus. tables, 23 refs.
(Contract AF 33(616)6548, Proj. 7885)
(ARL 62-395) Unclassified report

DESCRIPTORS: *Solar cells, *Photoelectric cells, *Storage batteries, *Power supplies, Semiconducting films, Semiconductors, Crystals, Zinc compounds, Cadmium compounds, Sulfides, Selenides, Tellurides, Thin films, Single crystals, Growth, Solvent action, Electric connectors, Processing, Spectrographic analysis, Evaporation, Optics, Vacuum systems, Solid state physics.

Investigation on the feasibility of stacking photovoltaic layers of different II-VI semiconducting compounds in intimate electrical contact in order to convert a larger fraction of the sun's radiation into electrical power than is possible in a single layer. Five problems are described and the results are tabulated. These problems are: the production of ZnS, ZnSe, ZnTe, CdSe, CdS, and CdTe crystals and/or thin films; CdS solar cell mechanism; the preparation of various configurations for a study of heterojunctions including ZnS-CdS, ZnTe-CdS, CdSe-CdS, CdTe-CdS, ZnSe-CdSe; and theoretical examinations of the abrupt p-n junction and the effect of surface states upon the electrical properties of semi-conducting crystals. (Author)

AD-288 455 Div. 7, 14
(TISTM/ODN) OTS price $1.10

Electro-Optical Systems, Inc., Pasadena, Calif.
HIGH TEMPERATURE SEMICONDUCTING COMPOUNDS FOR THERMOELECTRIC POWER GENERATION.
Bi-monthly progress rept. no. 4, 15 June-15 Aug 61,
by C. B. Jordan. 30 Aug 61, 9p. (EOS rept. no. 1592-2M-4)
(Contract NObs-84327)
Unclassified report

DESCRIPTORS: *Semiconductors, *Power supplies, Resistance, Intermetallic compounds, Thorium compounds, Sulfides, Selenides, Uranium compounds, Tellurides, Thermoelectricity.

AD-288 510 Div. 7
(TISTP/FR) OTS price $1.60

Weston Instruments Div., Daystrom, Inc., Newark, N. J.
PRODUCTION ENGINEERING MEASURE FOR RUGGEDIZED TAUT BAND SUSPENSION PANEL METERS PER SIGNAL CORPS TECHNICAL REQUIREMENTS SCS-43A.
Quarterly progress rept. no. 6, 1 July-30 Sep 62. 30 Sep 62, 9p.
(Contract DA 36-039-sc-85952)
Unclassified report

DESCRIPTORS: *Voltmeters, *Ammeters, Manufacturing methods.

A complete solution to the problem of balance change during the ruggedization tests was achieved. Coil reinforcing techniques, including an improved cementing process, were successfully applied to the 100, 180, and 250 degree meters. Satisfactory results after the ruggedization tests of vibration, tumbling and high shock were obtained on approximately 50 meters of the various sizes and ranges specified in the contract. The construction of the pre-production samples of all ranges of the one-inch, 180-degree meters, namely 0-1 milliamp, 0-50 volts, 0-100 microamps, 0-25 microamps, and 15-0-15 microamps has been initiated. Environmental testing of the 100-degree, VU meter was started to determine what tolerances will result from the non-linear circuit of this meter. Final drawings of the 100-degree and 180 degree meters have been reviewed by the Engineering, Manufacturing, Assembly and Methods Departments. All drawings have been brought up to date and released to the Manufacturing Department. The preparation of assembly and manufacturing specifications has begun. Final release of these specifications will be deferred until preproduction samples have been completed. (Author)

AD-288 570 Div. 7
(TISTE/CAM) OTS price $2.60

Melpar, Inc., Falls Church, Va.
A THIN-PLATE BATTERY.
Suppl. to Quarterly rept. no. 10, 15 Aug-15 Nov 62 on Molecular Circuit Development,
by R. T. Foley, J. Smit, and H. Titus. 15 Nov 62, 25p. incl. tables (Suppl. to AD-288 571)
(Contract NOw 60-0362-c)
Unclassified report

DESCRIPTORS: *Storage batteries, *Wet cells, *Miniature electrical equipment, Design, Anodes (Electrolytic cells), Cathodes (Electrolytic cells), Voltage, Experimental data, Mathematical analysis, Lithium, Magnesium, Chemical analysis.

Emphasis was placed on the fabrication of three 28-volt cell pack assemblies. A detailed discussion of these units is given. Further studies were continued on single-cell characteristics. Chemical analyses were performed on a replicate series of single cells. These cells were analyzed for residual m-dnb and reduction products. Study was undertaken to determine the effect of m-dnb particle size on cell performance. The performance of these cells was evaluated statistically by a variance-analysis method. Studies were conducted on voltage rise time during activation of multiple cells, on the no-load activation stand time of single cells, and on the discharge characteristics of single cells employing Mg-Li anodes. The details of these studies, as well as the pertinent data, are given. (Author)

AD-288 613 Div. 7
(TISTP/FR) OTS price $8.10

Oklahoma State U., Stillwater.
A METHOD OF ANALYSIS OF THE RELEASE CYCLE OF A

RELAY USING AN ANALOG COMPUTER.
Master's thesis,
by Vincent Paul Legare. 27 May 62, 74p. incl. illus. tables, 12 refs.
Unclassified report

DESCRIPTORS: *Electric relays, Simulation, Analog computers, Programming.

The dynamic behavior of the release cycle of a relay has been successfully demonstrated and the feasibility of using the analog computer for this type of work illustrated. The results agreed closely with the predicted results and with the experimental data obtained. From the results of the computer, recordings are presented to show the basic behavior of the coil current, flux density of the core, magnetic pull on the armature, total reluctance of the magnetic circuit, and the displacement, velocity and acceleration on the armature from the time a relay is de-energized until it reaches its steady state open position. (Author)

AD-288 645 Div. 7
(TISTM/BRW) OTS price $6.60

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
DESIGN OF HYDROGEN-OXYGEN CAPILLARY TYPE FUEL CELL.
Quarterly technical progress rept. no. 2, 1 Aug-31 Oct 62,
by N. P. Bannerton, J. P. Chong and others.
15 Nov 62, 29p. illus.
(Contract AF 33(657)8970, Proj. 8173)
Unclassified report

DESCRIPTORS: *Fuel cells, *Power supplies, Hydrogen, Oxygen, Capillary tubes, Space environmental conditions, Electrodes, Magnesium electrodes, Cooling, Evaporation, Water, Tests, Design, Electrochemistry.

Two laboratory models of a 50 watt orbital fuel cell package were assembled. One package is at A. S. D. for vibration and shock testing. Other packages are at the Allis-Chalmers Research Laboratories undergoing preliminary testing of fuel cells and cooling methods. The method selected to reject the heat burden produced by the fuel cell package operating in space is evaporative cooling using water. (Author)

AD-288 700 Div. 7
(TISTM/ODN) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
SMALL HERMETICALLY-SEALED NICKEL-CADMIUM STORAGE BATTERIES,
by M. A. Dasoyan. 29 May 62, 11p. (Trans. no. FTD-TT-61-271 from Vestnik Elektropromyshlennosti, No. 2, pp. 46-49, 1960)
Unclassified report

DESCRIPTORS: *Storage batteries, *Nickel, *Cadmium, Nickel compounds, Oxides, Electrodes.

AD-288 701 Div. 7
(TISTM/ODN) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
IMPROVEMENT OF CERTAIN OPERATIONAL CHARACTERISTICS OF SILVER-ZINC STORAGE BATTERIES,
by V. V. Romanov. 7 June 62, 8p. (Trans. no. FTD-TT-61-272 from Vestnik Elektropromyshlennosti, No. 9, pp. 26-29, 1960)
Unclassified report

DESCRIPTORS: *Storage batteries, *Silver electrodes, *Zinc electrodes, *Wet cells, Electrodes, USSR, Electrolytes, Silver, Zinc.

AD-288 768 Div. 7, 4
(TISTM/EJH) OTS price $1.10

California U., Berkeley.
ELUCIDATION OF ELECTROCHEMICAL REACTIONS AND SYSTEMS.
Annual summary rept. for year ending 30 June 61,
by Charles W. Tobias. Oct 61, 3p. (Technical memo. no. 44-12)
(Contract N123(62738)23531A)
Unclassified report

DESCRIPTORS: *Power supplies, *Electrochemistry, *Ammonia, Electrolytic cells, Electrodes, Electrolytes, Liquefied gases, Solutions.

AD-288 784 Div. 7
(TISTM/TCG) OTS price $8.10

Purdue U., Lafayette, Ind.
THE EFFECT OF PULSATION ON FUEL CELL PERFORMANCE.
Master's thesis,
by Donald R. Klang. Aug 62, 78p.
Unclassified report

DESCRIPTORS: *Fuel cells, *Electrolytes, *Pulse modulation, Potassium compounds, Hydroxides, Methanols, Oxygen, Electrodes, Deterioration.

AD-288 794 Div. 7
(TISTM/TCG) OTS price $1.60

Burgess Battery Co., Freeport, Ill.
BATTERY, WATER ACTIVATED BA-( )/U (DEVELOPMENT MODEL).
Final rept.,
by T. H. Loverude. 1 Mar 62, 13p. illus. tables.
(Contract DA 36-039-sc-88909)
Unclassified report

DESCRIPTORS: *Storage batteries, *Wet cells, *Water activated batteries, Preparation, Manufacturing methods, Copper compounds, Chlorides, Magnesium compounds, Design.

AD-288 801 Div. 7
(TISTM/BRW) OTS price $3.60

Little, Arthur D., Inc., Cambridge, Mass.
LOW TEMPERATURE OPERATION OF BATTERIES.
Quarterly progress rept. no. 1, 15 May-14 Aug 62,
by R. A. Horne and I. A. Black. 14 Aug 62, 37p. incl. illus. tables, refs.
(Contract DA 36-039-sc-90706, Proj. 3A99 09-002-02)
Unclassified report

DESCRIPTORS: *Dry cells, *Electrolytic cells, Electrochemistry, Low temperature research, Low temperature batteries, Thermal insulation, Heat of formation, Electrolytes, Chemical reactions, Temperature.

A literature search was conducted to establish the theoretical considerations of the effect of temperature on the capacity, potential and current of electrochemical cell. This information will serve as a basis for subsequent study of ways to improve battery performance at low temperature. Increasing viscosity of the electrolyte with decreasing temperature appears to be the phenomenon principally responsible for the poor performance of batteries at low temperature. An increase in electrolyte viscosity at low temperature retards the transport of reactants to and products from the reaction sites, making the withdrawal of appreciable currents increasingly difficult. The possible alternative approaches to the problem of the low temperature operation of batteries are listed. Advantages and disadvantages of diverse insulation groups presently

in use are discussed. Preliminary calculations which show the necessity to apply the evacuated powders or evacuated fiber insulation to the battery are presented. (Author)

AD-288 945 Div. 7, 8, 15
(TISTP/WH) OTS price $2.60

New York U., Coll. of Engineering, N. Y.
REPRESENTATIONS FOR CLASS K FUNCTIONS,
by A. H. Zemanian. 31 Aug 62, 19p. 11 refs.
(Scientific rept. no. 1)
(Contract AF 19(628)379, Proj. 5632)
(AFCRL 62-770) Unclassified report

DESCRIPTORS: *Functions, *Electrical networks, *Circuits, *Complex numbers, *Complex variables, *Integral transforms.

The class k functions represent a generalization of the concept of the positive-real function. This generalization is useful for the purposes of analysis since many properties of networks, whose transfer functions are class k functions, are known. That is, if the transfer function of a network happens to be a class k function, then this transfer function and its corresponding transient responses (such as the unit impulse response and unit step response) will satisfy a number of restrictions. One objective of this investigation has been to construct a definition for the class k functions only in terms of the behavior of these functions in the open right-half s-plane, as is done for positive-real functions. This will then allow such functions to have certain types of singularities on the s=jw axis. It is on the basis of this more general definition of class k functions that a successful attack is made on the second and principal objective: to develop a representation for class k functions, which is analogous to Cauer's representation for positive-real functions. (Author)

AD-288 952 Div. 7
(TISTM/ODN) OTS price $1.10

New York State Coll. of Ceramics, Alfred U.
HYDROGEN-OXYGEN ELECTRODE STUDY IN HYDROX FUEL CELLS.
Quarterly technical progress rept. no. 2,
by T. J. Gray and W. A. Bridgeo. 15 June 62, 6p.
(Contract AF 33(657)7564)
Unclassified report

DESCRIPTORS: *Fuel cells, *Oxygen electrodes, *Hydrogen electrodes, Electrodes, Gases, Graphite, Electroplating.

AD-289 062 Div. 7, 14
(TISTM/BRW) OTS price $2.60

Calvin Coll., Grand Rapids, Mich.
SILVER MIGRATION AND TRANSPORT MECHANISM STUDIES IN SILVER OXIDE-ZINC BATTERIES.
Quarterly technical progress rept. no. 2, 1 Aug-1 Nov 62,
by T. P. Dirkse and L. A. Vander Lugt. 1 Nov 62, 15p. illus. tables, 4 refs.
(Contract AF 33(657)8689)
Unclassified report

DESCRIPTORS: *Alkaline cells, *Battery separators, Electrodes, Silver electrodes, Zinc electrodes, Silver, Transport properties, Silver compounds, Oxides, Solubility, Potassium compounds, Hydroxides, Electrolytes, Ethylenes, Polymers, Cellulose, Esters, Acrylonitriles, Amides, Cellulose acetates, Tracer studies.

Thirteen different materials were checked for their reaction towards silver oxide dissolved in potassium hydroxide solutions. Of these, the polyethylenes appear to have most promise as separator materials. Several attempts were made to trace the migration of silver in a silver-cadmium cell by the use of radioactive silver. A method of counting the radioactivity is being developed. The main difficulty encountered in this study is the take-up of radioactive silver by the electrodes. This has obscured the interpretation of the results obtained to date. (Author)

AD-289 274 Div. 7, 4
(TISTM/EJH) OTS price $7.60

Monsanto Research Corp., Everett, Mass.
ELECTROCHEMICAL ENERGY CONVERSION SYSTEMS RESEARCH.
Final rept., 29 Sep 60-28 Sep 61,
by John O. Smith, Ralph G. Gentile and others.
20 Nov 61, 70p. incl. illus.
(Contract DA 19-129-qm-1698)
Unclassified report

DESCRIPTORS: *Fuel cells, *Power supplies, *Electrodes, *Oxygen electrodes, Hydrogen compounds, Peroxides, Electrolytes, Potassium compounds, Hydroxides, Sulfuric acid, Oxidation inhibitors, Catalysts, Electric potential, Polarization, Iodates, Permanganates, Electrochemistry.

Contents:
Apparatus and procedure
Interpretation of data
Hydrogen peroxide mechanism
Hydrogen peroxide electrode - electrolyte study
  NH_4 electrolyte
  $KHCO_3$ electrolyte
  KOH electrolyte
  H_2SO_4 electrolyte
Hydrogen peroxide electrode - peroxy-compound formation
Hydrogen peroxide electrode - peroxide decomposition inhibitors
Hydrogen peroxide electrode - effect of concentration
Oxidants other than hydrogen peroxide
Calculation of reversible potentials - Appendix 1
Details of apparatus - Appendix 2
Methods of catalyst preparation - Appendix 3

AD-289 278 Div. 7, 25, 26
(TISTM/EJH) OTS price $4.60

National Cash Register Co., Dayton, Ohio.
FEASIBILITY INVESTIGATION OF CHEMICALLY SPRAYED THIN FILM PHOTOVOLTAIC CONVERTERS.
Quarterly rept. no. 3, 1 Aug-31 Oct 62,
by R. R. Chamberlin. 31 Oct 62, 35p. incl. illus. tables, 7 refs.
(Contract AF 33(657)7919, Proj. 8173)
Unclassified report

DESCRIPTORS: *Semiconducting films, *Semiconductors, *Photoelectric cells, Diodes, Copper compounds, Cadmium compounds, Selenides, Sulfides, Thin films, Coatings, Crystals, Oxides, Glass, Heat resistant glass, Foils, Tin compounds, Heat treatment, Impurities, Deposits, Manufacturing methods.

Studies included: possible variations in the physical structure (crystallinity and crystallite orientation) of the semiconducting layer (CdS and CdSe) due to changes in the deposition parameters; the effect on different orientations due to heat treatment; changes in resistivity due to heat treat and doping; improvement of the deposition of the barrier layer; investigation of a barrier layer using copper selenide; search for a flexible (metal foil) substrate compatible with the film deposition conditions;

investigation of the possible correlation between crystallite orientation and crystallinity to photovoltaic response; and the spectral characteristics of the CdSe, CdS, and CdSe-CdS photovoltaic cells. (Author)

AD-289 308 Div. 7, 8, 15
(TISTP/WH) OTS price $1.60

Illinois U., Urbana.
AN EXTENSION OF PRONY'S METHOD TO FREQUENCY DOMAIN APPROXIMATION,
by J. B. Cruz, Jr. 1959, 12p. incl. illus.
(Contract AF 49(638)63)
Unclassified report

Proceedings of 4th Midwest Symposium on Circuit Theory, 1959.

DESCRIPTORS: *Electrical networks, *Frequency, *Transformations (Mathematics), *Circuits, *Electric filters, Differential equations, Functions.

The Prony method which was originally applied to time domain approximations will be extended to frequency domain approximations, in an attempt to make the number of poles of H(s) small. The method is to fit a homogeneous differential equation to the natural frequencies of the system. The residues at the chosen poles are then optimized in the least integral square sense on the JW axis. (Author)

AD-289 311 Div. 7, 5
(TISTP/ODN) OTS price $1.60

Illinois U., Urbana.
RECENT ADVANCES IN ACTIVE NETWORK SYNTHESIS,
by M. E. Van Valkenburg. 1959, 13p. incl. illus. 16 refs.
(Contract AF 49(638)63)
Unclassified report

Proceedings of the 4th Midwest Symposium on Circuit Theory Marquette University Milwaukee, Wis. Vol. 4, pp. N1-N13, December 1959.

DESCRIPTORS: *Electrical networks, *Transistors, Resistors, Transformers, Capacitors, Coils, Impedance, Theory, Sensitivity.

There are indications that active network synthesis has come of age. In the telephone industry, transistor-RC networks have only recently replaced passive LC networks in some applications. Recent developments in realization methods and performance criteria are outlined. In particular, the work at the University of Illinois is reviewed including that of Chien, Myers, and Thomas relating to realization, and by Kuo and Mikulski on sensitivity. This work is related to the important contributions of Linvill, Yanagisawa, and Horowitz. (Author)

AD-289 330 Div. 7
(TISTM/BRW) OTS price $6.60

Mallory Battery Co., North Tarrytown, N. Y.
TESTING AND EVALUATION OF PRIMARY ALKALINE CELLS AND BATTERIES.
Semi-annual rept. no. 4, 1 Sep 61-31 July 62,
by Roger Goodman. 31 July 62, 63p. incl. illus. tables.
(Contract DA 36-039-sc-78320)
Unclassified report

DESCRIPTORS: *Alkaline cells, *Primary batteries, Dry cells, Zinc, Mercury compounds, Oxides, Electric discharges, Temperature, Storage, Tests, Voltage, Test methods.

Testing of cells was performed under the revised Signal Corps Technical Requirement, SCL-6274A. Work continued on cell types 12R, 42R and 640R. In addition, cell types 1R, 502R, 625R, 1438R and 1450R were started in the program. The relative dispersion of cell test groups was used to limit testing to areas where useful data for battery application would be obtained. (Author)

AD-289 378 Div. 7, 8
(TISTE/CAM) OTS price $3.60

International Rectifier Corp., Los Angeles, Calif.
HIGH VOLTAGE SILICON RECTIFIER STACKS.
Quarterly progress rept. no. 5, 24 June-24 Sep 62 on Production Engineering Measure,
by Werner Luft. 24 Sep 62, 30p. incl. illus. tables, 2 refs.
(Contract DA 36-039-sc-85977)
Unclassified report

DESCRIPTORS: *Rectifiers, *Diodes, *Semiconductors, Silicon, Direct current, Voltage, Electrical corona, Temperature, Measurement, Design, Test sets, Test methods, Test equipment, Mechanical properties, Electric fields, Resistors, Capacitors.

Design testing of the third engineering samples was started. The first unit of the fourth engineering samples was built having an internal expansion chamber, corona endshields and a lesser number of higher voltage rectifier diodes. Thermal measurements confirmed closely the original calculations of temperature rise for the rectifier stack. The reduction in the number of rectifier diodes in the fourth engineering samples reduces the temperature rise appreciably. (Author)

AD-289 540 Div. 7, 20, 25, 8
(TISTP/WH) OTS price $10.50

General Atomic Div., General Dynamics Corp., San Diego, Calif.
PARAMETRIC STUDY OF DIRECT CONVERSION REACTOR POWER SYSTEMS.
Final technical rept., 1 Dec 60-31 Oct 62,
by W. B. Wright, Jr. 31 Oct 62, 133p. incl. illus. tables, 24 refs. (Rept. no. GA-3540)
(Contract Nonr-337100)
Unclassified report

DESCRIPTORS: *Electric power production, *Thermionic emission, *Nuclear power plants, *Light water reactors, *Reactor theory, *Reactor cores, *Heat transfer, *Reactor kinetics, Power.

A mathematical formulation of thermionic-cell dynamics for use in thermionic reactor design is developed. The formulation developed was incorporated into a digital computer code. This code was used in conjunction with neutronics and heat transfer calculations to investigate the interrelated thermionic-neutronic-heat-transfer problems of thermionic reactor design. Two main problem areas in the nuclear design of water-cooled thermionic reactors, i.e., the inherently large parasitic capture in thermionic cells and the power-flattening problem, are discussed. In order to define the problems that might arise in the design of an actual thermionic reactor plant, a conceptual design study of a 1-Mw(e) water-cooled thermionic reactor system was undertaken. Tungsten-clad emitters were purposely used in this study in order to evaluate the suitability of using materials with very high parasitic capture rates in a water-cooled system. (Author)

AD-289 541 Div. 7, 8
(TISTM/EJH) OTS price $5.60

Gulton Industries, Inc., Metuchen, N. J.
STATE OF CHARGE INDICATORS FOR ALKALINE BATTERIES.
Quarterly technical progress rept. no. 3, by M. Lurie and H. N. Seiger. 15 Nov 62, 45p. incl. illus. tables.
(Contract AF 33(657)8130, Proj. 3145)
Unclassified report

DESCRIPTORS: *Alkaline cells, *Electrostatic capacitance, *Phase measurement, Resistance, Electric currents, Electronic switches, Phase shifters, Phase meters, Electronic equipment, Electric discharge, Nickel, Cadmium.

A system was developed to measure the residual capacity of Nickel-Cadmium batteries by measuring the phase shift produced by the cell. The system was calibrated for three sizes of batteries. An average deviation of ±9% is reported for manually cycled batteries. Results of the first stages of tests on batteries with various histories are given. Data is presented indicating a high correlation between residual capacity and resistance measured during a short high current pulse. A device was designed to measure resistance during the first few msec. of a pulse of several hundred amperes. This device will provide a means of measuring current when a load of about 1/2 milliohm is connected across a cell for a short time. (Author)

AD-289 559 Div. 7, 4
(TISTM/EJH) OTS price $3.60

Pennsylvania State U. Mineral Industries Experiment Station, University Park.
REDOX FUEL CELLS : THE FUEL REGENERATOR,
by L. G. Austin, R. D. Chamberlin, and A. R. Schleicher. Aug 62, 27p. 12 refs.
(Contract DA 49-186-502-ORD-917)
Unclassified report

DESCRIPTORS: *Fuel cells, *Power supplies, *Oxidation-reduction reactions, *Electrochemistry, Tin, Titanium, Ions, Valence, Fuels, Oxidation, Reduction, Hydrocarbons, Methanols, Formaldehyde, Formic acids.

An essential feature of a redox fuel cell employing a cheap hydrocarbon fuel is that the fuel must reduce the metallic ion (produced from the cell) at a reasonable rate. A large number of tests on the titanyl-titanous system and the stannic-stannous system, at temperatures up to 200 C, indicate that formic acid, formaldehyde and methanol will not reduce the higher valent ion to the lower at a feasible rate. Considerations of thermodynamic equilibrium, solubility and mass transport predict that regeneration by hydrocarbons will be even less feasible. (Author)

8. ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-287 910 Div. 8
(TISTP/WH) OTS price $9.60

New Mexico U. Engineering Experiment Station, Albuquerque.
TECHNIQUES FOR SOLVING WAVEGUIDE DISCONTINUITY PROBLEMS WITH AN INTRODUCTION TO THE ANALYSIS OF WAVEGUIDES TERMINATED BY LONGITUDINAL FINS,
by S. H. Durrani. Mar 62, 105p. incl. illus. 45 refs. (Technical rept. no. EE-71)
(Contract DA 29-040-ORD-1238)
Unclassified report

DESCRIPTORS: *Microwaves, *Waveguides, *Instrumentation, *Atmosphere, *Resonance, *Cavity resonators, Simultaneous equations, Transformations (Equations), Green's function, Refractive index.

A survey is made of the techniques available for solving waveguide discontinuity problems. The work of Marcuvitz, Collin, Lewin, Noble and Schwinger is given special attention; selected parts are summarized and collected here to obtain a complete picture. The variational technique of Schwinger and the quasi-static method of Lewin are worked out in some detail, because of their wide application and simplicity; the Wiener-Hopf technique is similarly treated, because of its rigour. Fundamental equations are set up for guides of rectangular and circular cross section, which are partitioned into four parts at z=0 by longitudinal fins. Expressions are derived for the equivalent-circuit susceptance in terms of the two transverse components of the electric field in the z=0 plane. The procedure for obtaining solutions is indicated but has not been carried out to completion. (Author)

AD-287 921 Div. 8, 25, 26
(TISTE/OHD) OTS price $11.00

Westinghouse Electric Corp., Baltimore, Md.
STUDY OF FAILURE MECHANISMS.
Quarterly progress rept. no. 3, 1 Jan 61-31 Mar 62,
by S. M. Skinner and J. W. Dzimianski. Oct 62, 136p. incl. illus. tables, refs. (Rept. no. 382A3)
(Contract AF 30(602)2558, Proj. 5519)
(RADC TDR 62-407) Unclassified report

DESCRIPTORS: *Electronic equipment, *Reliability, Test methods, Life expectancy, Statistical tests, Tests, Surface properties, Sliding contacts, Friction, Transistors, Thermal stresses, Radiation damage, Statistical analysis, Diodes, Semiconductors, Mathematical analysis.

Failures from the assembly and testing of a military data processing system were examined statistically. A degrees-of-freedom statistical approach to determining failure ratios of different devices under environmental and processing conditions similar to those studied by hypothesized. An analysis of the instrumentation of the surface studies being undertaken in the investigation are given. The utility of the frictional probe in making precise surface measurements is demonstrated. Samples of transistor failure mechanism data caused by a surface charge on the transistor passivating surface are given. The use of the loss factor to determine the frequency region in which damage may be expected because of internally generated heat during operation is discussed. Early results on the effects of transient breakdown voltages on transistor performance and the progress in the studies of the effect of high energy radiation on solid materials, by the Mossbauer effect and by the performance of solid state diodes, are given. (Author)

AD-287 924 Div. 8, 15
(TISTP/WH) OTS price $1.60

Air Force Cambridge Research Labs., Bedford, Mass.
FOURIER COEFFICIENTS FOR TCHEBYSCHEFF PATTERNS.
Research rept.,
by Charles J. Drane, Jr. Sep 62, 14p. 8 refs.
(Rept. no. AFCRL 62-726)
Unclassified report

DESCRIPTORS: *Polynomials, *Antennas, *Fourier analysis, *Numerical methods and procedures.

The use of Tchebyscheff polynomials in the optimum design of linear, broadside arrays involves a tedious calculation of the coefficients that represent the currents in the array. Two new methods that can be used to simplify the computations for these Tchebyscheff coefficients are presented. (Author)

AD-287 968 Div. 8, 26
(TISTE/CAM) OTS price $2.60

General Electric Co., Owensboro, Ky.
Z-5267 CERAMIC TETRODE, 40 WATTS AT 3000 MC.
PRODUCTION ENGINEERING MEASURE.
Quarterly progress rept. no. 1, 23 May 62-31 Aug 62,
by V. W. Amoth. 31 Aug 62, 13p. incl. illus.
(Rept. no. 1)
(Contract DA 36-039-sc-86735)
Unclassified report

DESCRIPTORS: *Tetrodes, *Manufacturing methods, Ceramic materials, Superhigh frequency, Electron tubes, Industrial production, Ultra high frequency, Design, Processing, Titanium compounds, Hydrides.

Progress on a technique to produce 75 ceramic tetrodes, 40 watts, 3000 mc, per month is reported. The tube was reviewed with tightened dimensions, and some operations were simplified for tube production. A driver was developed for the amplifier tube under test, which requires 7 watts at 3,000 mc. Although some of the materials took longer to obtain than originally anticipated, this lost time can be made up in most cases by initially using parts left over from the previous contract. Other aspects of the program are on schedule. (Author)

AD-288 030 Div. 8, 30
(TISTW/RD) OTS price $1.10

General Electric Co., Utica, N. Y.
QRC-139A AEROSPACE GROUND EQUIPMENT (AGE).
Monthly progress rept. no. 8, 6 Oct-6 Nov 62. 10 Nov 62, 4p.
(Contract AF 33(604)39443)
Unclassified report

DESCRIPTORS: *Radiofrequency spectrum analyzers, S band, L band, Broadband, Ground support equipment.

AD-288 038 Div. 8, 32
(TISTE/CAM) OTS price $1.10

Aerospace Information Div., Washington, D. C.
SEMICONDUCTING DIAMONDS. ANNOTATED BIBLIOGRAPHY

(PRELIMINARY).
2 Nov 62, 5p. (AID rept. no. 62-180)
Unclassified report

DESCRIPTORS: *Semiconductors, *Bibliography, *Diamonds, USSR.

AD-288 047 Div. 8
(TISTP/FR) OTS price $1.10

Aerospace Information Div., Washington, D. C.
RECORDING GEOMAGNETIC FIELD VARIATIONS,
by Yu. M. Yegorov. 18 Oct 62, 2p. illus. (AID rept. no. 62-160 Trans. from The Problem of Recording Geomagnetic Field Variations in the 0.1 to 10 cps. Frequency Range. IN: Akademiya Nauk SSSR Izvestiya. Seriya Geofizicheskaya, No. 5, pp. 677-678, May 1962)
Unclassified report

DESCRIPTORS: *Recording systems, Terrestrial magnetism, Extremely low frequency, Coils, Mirrors, Photomultipliers.

AD-288 052 Div. 8, 26
(TISTW/PCR) OTS price $3.60

RCA Industrial Tube Products, Lancaster, Pa.
PRODUCTION ENGINEERING MEASURE TUBE TYPE A2582A (RCA 7801).
Quarterly rept. no. 9, 1 July-30 Sep 62,
by Ben Sheren. 30 Sep 62, 25p. incl. illus.
(Contract DA 36-039-sc-85947)
Unclassified report

DESCRIPTORS: *Electron tubes, *Production, Electrodes, Test equipment, Brazing, Heaters, Nickel, Thickness, Molybdenum, Electric discharges, Vacuum systems, Tests, Feasibility studies, Design, Manufacturing methods.

AD-288 092 Div. 8, 25
(TISTP/WH) OTS price $5.60

Aerospace Corp., El Segundo, Calif.
EFFECT OF SCHOTTKY EMISSION ON THERMIONIC CONVERTER CURRENTS IN IGNITED MODE,
by G. L. Johnston. 15 Aug 62, 43p. incl. illus. table, 25 refs. (Rept. no. TDR-69(2220-50)TR-3)
(Contract AF 04(695)69)
(DCAS TDR 62-149) Unclassified report

DESCRIPTORS: *Thermionic emission, *Electric fields, *Work functions, *Anodes, *Electrons, *Electric currents, *Space charge, Cesium.

A theoretical model of a cesium thermionic converter operating in the ignited mode is investigated to determine the possible role of Schottky emission produced by the accelerating field of an ion rich emitter sheath in causing the high currents observed in that mode. The electric field intensity adjacent to the emitter is determined as a function of plasma density, electron temperature, and emitter sheath potential by integration of Poisson's equation between sheath edge and emitter. The interelectrode plasma is considerated to be uniform. Simultaneous solution of relationships permits generation of current-voltage characteristics. The Schottky effect is a substantial contributing factor in the production of observed high currents. The present analysis yields currents which saturate with reduced load voltage in contrast to the behavior of experimental characteristics. This strongly suggests the operation of other mechanisms, in addition to the Schottky effect, which produce a reduction of work function with reduction of load voltage. (Author)

AD-288 093 Div. 8, 25
(TISTP/JW) OTS price $2.60

Aerospace Corp., El Segundo, Calif.
ELECTRONICS PROGRAM. SECURE COMMUNICATIONS TECHNIQUES.
Semiannual technical rept., 1 Jan-30 June 62,
by P. Finch. Sep 62, 18p. incl. illus. (Rept. no. TDR-69(2250-36)TR-2)
(Contract AF 04(695)69)
(DCAS TDR 62-188) Unclassified report

DESCRIPTORS: *Secret communication systems, *Nonlinear systems, Design, Elasticity, Test methods, Data processing systems, Data transmission systems, Electronic systems.

A generic secure communications system was assembled. This system is currently being tested and will be employed in evaluating various nonlinear aspects of proposed secure communication systems. (Author)

AD-288 102 Div. 8
(TISTP/JW) OTS price $16.00

Stanford Research Inst., Menlo Park, Calif.
SYSTEM CONCEPTS FOR A COMMON-USER RADIO TRANSMISSION SOUNDING SYSTEM (CURTS).
Final rept.,
by R. G. Gould and W. R. Vincent. Oct 62,
241p. incl. illus. tables, 12 refs.
(Contract SD-119, SRI Proj. 3992)
Unclassified report

DESCRIPTORS: *Radio transmission, *Ionospheric disturbances, Magnetic fields, Radio interference, Sound ranging, Radio communication systems, High frequency.

A Common-User Radio Transmission Sounding System (CURTS) is studied. It is demonstrated that oblique ionospheric sounders can find usable frequencies during periods of a disturbed ionosphere and that usable frequencies can be predicted with high accuracy for periods of a quarter of an hour or more during times of average magnetic activity. During both average and disturbed times, a communications circuit operator can use a sounder to improve performance. A systems operational concept for use of sounders is described and analyzed. It is concluded that common use of sounders is desirable and necessary for purposes of interference reduction, optimum utilization of equipment, and minimum cost. Problems that have arisen during field tests are discussed, as well as unresolved technical and operational questions. It is concluded that sounders are a promising operational tool but that certain questions must be settled by additional study and field tests before operational employment of sounders is undertaken. (Author)

AD-288 104 Div. 8
(TISTP/WH) OTS price $1.60

Chatham Electronics Div., Tung-Sol Electric, Inc., Livingston, N. J.
PRODUCTION ENGINEERING MEASURE FOR TYPE 7890 SUPER POWER HYDROGEN THYRATRON.
Quarterly progress rept. no. 2, 8 June-7 Sep 62,
by C. L. Shackelford. 7 Sep 62, 12p.
(Contract DA 36-039-sc-85984)
Unclassified report

DESCRIPTORS: *Thyratrons, *Hydrogen, Design, Production.

The capability to produce 10 tubes/month on a single shift basis is to be proven by a pilot production run. All parts to make initial tube

assemblies were ordered and most of them received. The ceramic cylinders forming the tube envelope are 94% alumina bodies. The metallic components of the envelope are of Ceramvar, an alloy having expansion characteristics to match those of the ceramic. Some substitutions have been necessary in the interests of speed to obtain first samples. Tooling is almost complete. (Author)

AD-288 120 Div. 8
(TISTE/OHD) OTS price $2.60

Electron Physics Lab., U. of Michigan, Ann Arbor.
RESEARCH AND DEVELOPMENT ON HIGH-POWER CRESTATRONS FOR THE 100-300 MC FREQUENCY RANGE.
Quarterly progress rept. no. 9, 1 July-1 Oct 62, by J. E. Boers and G. T. Konrad. Oct 62, 20p. incl. illus. (Rept. no. 03783-10-P)
(Contract NObsr-81403)
Unclassified report

DESCRIPTORS: *Traveling wave tubes, *Radiofrequency power, *Radiofrequency amplifiers, Electron beams, Electron optics, Electron guns, Anodes (Electron tubes), Programming, Digital computers, Electron tubes, Design, Helixes, Very high frequency.

A gun of perveance 4.46 with an Einzel lens was tested in a beam analyzer in conjunction with a new beam collector. Secondary emission from this collector was eliminated, permitting accurate measurements to be made on the interception on all gun electrodes. A well behaved and controllable electron beam was obtained. The digital computer program to analyze axially symmetric guns is in the check-out stage. Work on the new 100-300 mc crestatrons is under way. The electrical and mechanical designs on the prototype tubes were completed. Cold test results are presented. (Author)

AD-288 131 Div. 8, 25
(TISTP/JW) OTS price $3.60

Pennsylvania State U. Mineral Industries Experiment Station, University Park.
POLARIZATION AT POROUS FLOW-THROUGH ELECTRODES, by L. G. Austin and R. R. Klimpel. Sep 62, 37p. 9 refs. (Rept. no. 2)
(Contract DA 49-186-502-ORD-917)
Unclassified report

DESCRIPTORS: *Kinetic theory, *Electrodes, Fluid flow, Polarization, Resistance, Porosity, Conductivity, Density, Electrochemistry.

The combined effects of electrochemical kinetics, ohmic resistance and mass transport were studied theoretically for a porous electrode through which an electrochemical reactant is flowing uniformly. A simplified treatment neglecting ohmic resistance gives an equation which is easily solved. The inclusion of ohmic resistance leads to an equation which has no convenient analytical solution. This equation was solved numerically using a suitable range of parameters. These solutions show the respective effects of all the important parameters, including exchange current, concentration, rate of flow, conductivity, thickness of electrode, etc. The theory was tested with limited data available in the literature and was found to describe these results in a reasonably satisfactory manner. Discussion is given of the use of the theory in designing flow-through electrode systems. Possible applications of this technique are discussed briefly and the technique appears to have possibilities for the study of the effectiveness of electrode structure and area. (Author)

AD-288 200 Div. 8
(TISTP/WH) OTS price $3.60

Electrical Engineering Research Lab., U. of Illinois, Urbana.
RESEARCH STUDIES ON PROBLEMS RELATED TO ANTENNAS, Quarterly progress rept. no. 4, 1 June-31 Aug 62.
1 Oct 62, 33p. incl. illus. table, 8 refs.
(Contract AF 33(657)8460)
Unclassified report

DESCRIPTORS: *Antennas, *Helical antennas, *Dipole antennas, *Conical antennas, *Coupled antennas, *Lens antennas, *Impedance, Lobing, Electrical properties, Cerenkov radiation.

The purpose of this investigation is to explain the observed properties of log-periodic antennas through experimental and analytical investigation of their uniform periodic counterparts. (Author)

AD-288 223 Div. 8
(TISTE/CAM) OTS price $9.10

Lincoln Lab., Mass. Inst. of Tech., Lexington.
OPERATIONAL CHARACTERISTICS OF 16 ELECTRON-BEAM PARAMETRIC AMPLIFIERS IN A 900 MCPS PHASE ARRAY, by John H. Teele. 6 Aug 62, 106p. incl. illus. tables, 12 refs. (Rept. no. 41 G-1)
(Contract AF 19(628)500)
(AFESD TDR 62-146) Unclassified report

DESCRIPTORS: *Parametric amplifiers, *Electron beams, *Electron wave tubes, Ultra high frequency, Radiofrequency amplifiers, Signal-to-noise ratio, Voltage, Phase distortion, Phase measurements, Resistance, Waveguide couplers, Standing wave ratios, Electronic equipment, Test equipment, Experimental data, Measurement.

The results of an extensive testing program designed to measure the short-term and long-term operational characteristics of the electron-beam parametric amplifier (EBPA) are presented. Particular emphasis is given to those characteristics which are of interest to designers of phased-array radars. Week-long pump-on amplitude stabilities better than 1 db rms and concurrent pump-on phase stabilities better than 1 degree rms were obtained after certain problems, associated with the EBPA's sensitivity to small changes in magnetic field strength, had been overcome. Other important EBPA characteristics are considered in detail; among these are: double-channel noise figure, gain-phase tracking, phase-frequency tracking, etc. Lift-test data is presented which indicates an EBPA life in excess of 2,500 hours. (Author)

AD-288 252 Div. 8
(TISTP/FR) OTS price $1.60

Electrical Engineering Research Lab., U. of Illinois, Urbana.
ON A CONICAL QUAD-SPIRAL ARRAY, by John D. Dyson. Sep 62, 7p. incl. illus. 10 refs. (Technical rept. no. 63)
(Contract AF 33(657)8460, Proj. 6278)
Unclassified report

Paper presented at the 1962 National Telemetering Conference, 23-25 May 1962, Washington, D. C.

DESCRIPTORS: *Telemetering antennas, *Helical antennas, *Conical antennas, Very high frequency, Ultra high frequency.

The shift in telemetry activity to the microwave region will require that some installations provide the capability of working on several

bands in the range of frequencies from 220 through 2400 mc. An antenna is proposed which will provide circularly polarized, moderate gain coverage throughout this range of frequencies. The conical log-spiral antennas may be designed to cover an arbitrarily wide range of frequencies and may be employed as array elements. An array of 4 such elements, a 'conical quad-spiral array', was constructed and tested from 400 to 4000 mc. It may be readily scaled to cover the UHF and microwave telemetry bands. (Author)

AD-288 253 Div. 8
(TISTP/WH) OTS price $1.60

ITT Industrial Labs., Fort Wayne, Ind.
PRODUCTION ENGINEERING MEASURE FOR TYPE FW-202 BARRIER-GRID STORAGE TUBE.
Quarterly progress rept. no. 5, 1 July-30 Sep 62,
by J. M. Abraham. 8 Nov 62, 14p. incl. illus. table (Serial no. 3235)
(Contract DA 36-039-sc-85967)
Unclassified report

DESCRIPTORS: *Storage tubes, *Electron guns, *Focusing, *Production.

The fixture and jigs necessary for making guns using multiform glass for support were completed. A program was completed on evaluation of various gun designs, for maximum resolution and correction of deflection defocusing. Twelve experimental tubes were built and evaluated. (Author)

AD-288 258 Div. 8, 25
(TISTP/JW) OTS price $6.60

Goettingen U. (Germany).
ABSORPTION AND TRANSMISSION OF ELECTROMAGNETIC WAVES. PHASE L. RESONANCE ABSORBERS WITH ABSORBING STRUCTURES IN OR BEHIND A METAL PLATE.
Final technical rept.,
by S. Luhmann. 30 Sep 62, 61p. incl. illus. table, 14 refs.
(Contract AF 61(052)154)
(RADC TDR 62-530) Unclassified report

DESCRIPTORS: *Electromagnetic waves, *Magnetic materials, Absorption, Transmission, Scattering, Broadband, Microwave equipment, Crystal structure, Lattices, Polarization, Waveguides, Attenuation, Impedance.

A number of resonance absorbers for electromagnetic waves are described, which serve for the reflectionless coating of a metal wall. The absorbers are characterized by the fact that the absorbing structure is placed behind the metal wall to be protected. Coupling of the incident wave to the absorbing structure is made through small openings in the metal plate. Rectangular, triangular and circular ring slots were used as coupling holes. With a wedge absorber behind the metal plate the reflection coefficient r was below 0.1 within a frequency interval with a relative bandwidth of about 10%. Absorbing strip-line components were developed in order to achieve a thin absorbing structure and to compensate the frequency dependence of the impedance of the coupling holes. With these components an operating range $r < 0.1$ with a relative bandwidth of about 6% was attained. The reflection coefficient was measured in the frequency range 8 to 14 kmcps. Its dependence on the number of coupling holes per unit area and on various parameters of the absorber elements was investigated. (Author)

AD-288 262 Div. 8, 25, 26
(TISTE/OHD) OTS price $2.60

Westinghouse Electric Corp., Dayton, Ohio.
500 C SILICON CARBIDE RECTIFIER PROGRAM.
Interim technical progress rept. no. 4, 1 July-30 Sep 62,
by H. C. Chang, R. B. Campbell and others.
Oct 62, 18p. incl. illus.
(Contract AF 33(657)7027)
(ASD TR 8-828, vol. 4) Unclassified report

DESCRIPTORS: *Crystal rectifiers, *Crystals, *Manufacturing methods, Carbides, High temperature research, Silicon compounds, Sublimation, Growth, Vacuum furnaces, Laboratory furnaces, Gases, Processing, Encapsulation, Argon, Hydrogen, Tantalum alloys, Gold.

Silicon carbide crystals of the hexagonal type were grown in a kroll-type furnace by the sublimation technique. Both homogeneous and grown junction crystals were prepared. A new kroll-type furnace was constructed. Preliminary runs were made yielding crystals of high purity. The growth of junction crystals has emphasized the preparation of crystals with a high degree of perfection. The methods and materials of rectifier fabrication are being studied. Ambient effects and electrical characteristics of 3 rectifiers are given. (Author)

AD-288 272 Div. 8
(TISTA/SAT) OTS price $3.60

Goettingen U. (Germany).
ABSORPTION AND TRANSMISSION OF ELECTROMAGNETIC WAVES. PHASE J. INVESTIGATION OF INTERDEPENDENCE OF ABSORBER DESIGN PARAMETERS. (BROADBAND MAGNETIC LAYER ABSORBERS WITH SMALL THICKNESS).
Technical (Annual) rept.,
by H. W. Helberg. 30 Sep 62, 34p. incl. illus. tables, 3 refs.
(Contract AF 61(052)154)
(RADC TDR 62-528) Unclassified report

DESCRIPTORS: *Electromagnetic waves, *Ferrites, Dielectric properties, Materials, Microwaves, Broadband, Absorption.

Two ferrite materials, Ferramic E and Ferramic E 1960, were used as magnetic layer absorbers. The measured reflection coefficients were below 10% in the frequency ranges 4.2 x 10 to the 7th to 3.8 x 10 to the 8th and 2.4 x 10 to the 8th to 7.6 x 10 to the 8th, respectively. The thicknesses of layer were 0.88 cm and 0.5 cm respectively. These measurements confirmed the reflection coefficients calculated from the relative dielectric constant and relative permeability. Various materials were tested with respect to their applicability as absorber material. (Author)

AD-288 282 Div. 8
(TISTP/WH) OTS price $1.10

South Carolina U., Columbia.
(No title).
Final rept.,
by L. L. Chang and J. B. O'Neal. 31 Aug 62, 11p. 5 refs.
(Contract AF 49(638)175)
Unclassified report

DESCRIPTORS: *Thermionic emission, *Electron tubes, Contamination.

The collection of very low velocity electrons by metallic surfaces in a complex phenomenon and merits further study. Contamination is always present and may be a powerful factor in the

behavior of a particular surface. The electrons rejected by a surface influence the characteristics of electron deviced in many ways, among there being the macroscopic phenomenon known as ''Black out'' as well as second order effects such as gain variation in DC amplifiers, frequency drift in oscillators, and noise in high gain amplifiers. (Author)

AD-288 283 Div. 8
(TISTP/FR) OTS price $1.75

National Bureau of Standards, Boulder, Colo.
ON THE CLIMATOLOGY OF GROUND-BASED RADIO DUCTS AND ASSOCIATED FADING REGIONS,
by E. J. Dutton. 16 June 61, 38p. incl. illus. 10 refs. (Technical note no. 96)
Unclassified report

DESCRIPTORS: *Propagation, *Refraction, *Attenuation, Atmosphere, Radio waves, Periodic variations.

Maximum observed incidence of ducts was determined to be 13, 10 and 5% by analysis of 3 to 5 years of radiosonde data for a tropical, temperate, and arctic location, respectively. Annual maxima are observed in the winter for the arctic and summer for the tropics. Arctic ducts arise from ground based temperature inversions with the ground temperature less than -25 C; temperate zone ducts arise from radiation inversions and accompanying humidity lapse; while tropical ducts occur with slight temperature and humidity lapses when the surface temperature is is 30 C and greater. The mean initial elevation angle of a radio ray trapped by these ducts is found to be about 3 mr, with the maximum value about 5.8 mr. The steepest gradient of N observed is -420 N units/km. Observed ducts trap radio-waves of frequency higher than 1 kmc at all locations for at least 50% of the time. Fading regions arising from abnormal defocussing of radio-rays passing from an elevated antenna down through the duct to a ground-based receiver are analyzed. The horizontal extent of these regions is determined for the same arctic, tropic, and temperate conditions given above. (Author)

AD-288 284 Div. 8
(TISTB/SAT) OTS price $1.50

National Bureau of Standards, Boulder, Colo.
TECHNIQUES FOR COMPUTING REFRACTION OF RADIO WAVES IN THE TROPOSPHERE,
by E. J. Dutton and G. D. Thayer. 17 Oct 61, 55p. incl. illus. tables, 13 refs. (Technical note no. 97)
Unclassified report

DESCRIPTORS: *Radio waves, Atmosphere, Mathematical analysis, Atmospheric refraction.

Eight methods of computing atmospheric refraction of radio rays are discussed with appropriate theoretical background. These methods are: the high-angle, or astronomical, refraction case; the statistical method; the low-angle, or terrestrial, refraction case (Schulkin's method); the four-thirds earth model; the exponential model; the initial gradient correction method; the departures-from-normal method; and a graphical method (Weisbrod's and Anderson's method). Sample computations are included for each of the methods. (Author)

AD-288 291 Div. 8
(TISTW/RD) OTS price $8.60

Army Electronic Proving Ground, Fort Huachuca, Ariz.
TACTICAL ANTENNAS DEVELOPMENT OF QUICK-REACTION ANTENNA SYSTEMS FOR TACTICAL USE,
Final rept.
Aug 62, 91p. incl. illus. tables (Pub ETA 8)
Unclassified report

DESCRIPTORS: *Antenna masts, *Antennas, Radio communication systems, Mobile, Broadband.

Tests were conducted to determine (1) the feasibility of employing telescoping masts and broadband, lightweight antenna arrays which would minimize antenna installation time for Radio Sets AN/MRC-54, -69, and -73 all of which include basic Radio Set AN/TRC-24; (2) a suitable replacement for the presently used AB-238( )/G sectional type mast, and one mast-launcher and four telescoping masts were tested and evaluated (these represented a sampling of 25- and 50-foot pneumatic and mechanically operated masts); and (3) a suitable replacement for the presently used AN/TRC-24 yagi and plane-reflector antenna arrays. It was concluded that: (a) commercial telescopic masts lack durability, are subject to frequent failure, and therefore are not suitable for continuous field use; (b) the mast-launcher type mast, when modified to correct deficiencies, will minimize AN/TRC-24 antenna installation time and be applicable to heights up to 50 feet; (c) the quick-erectable mast when modified to correct deficiencies will be particularly suitable for highly mobile, radio-relay sets in forward areas or where a 25-foot height is acceptable; and (d) yagi, corner-reflector, and helical antennas offer no advantages over the present AN/TRC-24 antennas. (Author)

AD-288 511 Div. 8
(TISTP/FR) OTS price $5.60

General Telephone and Electronics Labs., Inc., Bayside, N. Y.
STUDY OF FAILURE MECHANISMS IN HIGH POWER RADIO FREQUENCY GENERATING DEVICES.
Quarterly rept. no. 2, 20 Mar-20 June 62,
by M. Friedman Axler and R. A. Hein. 30 June 62, 53p. incl. illus. tables (Rept. no. TR62-254.2)
(Contract AF 30(602)2595)
(RADC TDR 62-410) Unclassified report

DESCRIPTORS: *Traveling wave tubes, Gases, Mass spectroscopy, Electron tube heaters, Vacuum systems, Reliability.

An examination of the gases in operating gridded-power traveling wave tubes was undertaken with a view to determining the causes of tube failures. Individual tube components, under conditions simulating an operating tube, were also investigated to learn the source and behavior of gases present. Gas analyses were made on both the operating tube and the tube components by means of a permanently attached omegatron mass spectrometer. Data are presented on two types of traveling wave tubes, one KIC getter, a sub-assembly (gun-tester) and coated heater coils. For knowledge of the total gas content of a material which can be released upon heating, a hot extraction method was used in conjunction with a commercial mass spectrometer. Kovar tube components were studied in this manner. (Author)

AD-288 512 Div. 8
(TISTP/JW) OTS price $2.60

General Electric Co., Syracuse, N. Y.
STUDY OF ELECTRON FOCUSING BY NON-LINEAR SPIRALS.
Interim engineering rept. no. 2, 30 June-31 Oct 62,
by Kurt Schlesinger. 31 Oct 62, 23p. incl. illus. tables.
(Contract AF 33(657)7682)
Unclassified report

DESCRIPTORS: *Image tubes, *Electrons, Electrostatics, Optical systems, Nonlinear systems, Cathodes (Electron tubes), Diodes, Triodes, Thermionic emission, Lenses.

Image-tube systems with spiral optics were investigated in the demountable. All tubes are imaging a plane cathode (2-1/2'' diameter) on a plane screen. A first optical system uses only one spiral-lens section and produces an essentially fixed mangification of 0.67. A second refined tube uses a tandem spiral-lens, giving it a capability for ''Zoom-lens'' operation. A range of magnification of 4:1 is reported. This occurs in three distinct conditions of 4/3, 2/3, and 1/3 which are practically noncontingent. Several of the test tubes have employed spirals coated by a thin protective film, having an electronic conductivity of 10 to the 10th power ohms per square. (Author)

AD-288 535 Div. 8
(TISTP/FR) OTS price $3.60

National Bureau of Standards, Boulder, Colo.
CURVES FOR GROUND WAVE PROPAGATION OVER MIXED LAND AND SEA PATHS.
Report on Antenna Patterns in the Presence of Finite Ground Surfaces,
by James R. Wait and Lillie C. Walters.
20 Apr 62, 33p. incl. illus. 20 refs. (Scientific rept. no. 19)
(AFCRL 62-330) Unclassified report

Presented at meeting of the International Scientific Radio Union, May 2, 1962, Washington, D. C.

DESCRIPTORS: *Propagation, Radio waves, Very low frequency, Low frequency, Medium frequency, Earth, Sea water, Mathematical analysis, Statistical analysis.

Specific numerical results are presented for ground wave propagation over paths which are part sea and part land. The problem is idealized to the extent that the earth is a smooth spherical surface. The method is based on a previous formulation in terms of mutual impedance between two vertical electric dipoles on an inhomogeneous spherical earth. Amplitude and phase of the ground wave are given for various combinations of the following parameters: frequency 1000, 100, and 20 kc; land conductivities 100 and 10 millimhos/meter; and a sea conductivity of 4 mhos/m. Most of the curves exhibit the well known recovery effect which occurs beyond the coastline for propagation from land towards the sea. (Author)

AD-288 544 Div. 8
(TISTP/FR) OTS price $4.60

General Microwave Corp., Farmingdale, N. Y.
MODIFICATION OF THE SG-155(XE-3)/U UHF-FM SIGNAL GENERATOR.
Final rept., 1 July 61-25 May 62,
by Charles Lamensdorf. 25 May 62, 43p. incl. illus. tables.
(Contract DA 36-039-sc-87349)
Unclassified report

DESCRIPTORS: *Signal generators, Frequency modulation, Design.

Government-furnished FM signal generators were modified to meet the governing technical specification SCL 1605 and modification specification SCL-4294. Some of the electrical and mechanical modifications were made in accordance with the modification specification. Other modifications and design changes became necessary during the program in order to meet the required performance characteristics specified in SCL 1605. Some of the more important changes incorporated in the units were: design and installation of a new transistorized power monitor bridge; design and installation of new transistorized klystron filament power supply; modification of the existing beam power supply; redesign of deviation metering system; modification of thermistor probe design; installation of new coaxial switches; and modification of transit case. (Author)

AD-288 547 Div. 8
(TISTE/CRJ) OTS price $1.60

Army Electronics Research and Development Lab., Fort Monmouth, N. J.
THE COMING ERA OF MICROELECTRONICS,
by J. D. Meindl and M. Tobman. Aug 62, 14p. incl. illus. 6 refs. (ASRDL technical rept. no. 2297)
Unclassified report

DESCRIPTORS: *Microminiaturization (Electronics), *Solid state physics, Electronic circuits, Electronic equipment, Reliability, Costs, Transistors, Diodes, Semiconductors, Resistors, Capacitors, Digital systems.

Solid-state electronics is now at the threshold of the era of microelectronics. The salient feature of microelectronics is integration typified by the functional device. A functional device consists of an interconnected array of conventional devices--transistors, diodes, capacitors, and resistors--fabricated in situ within a single crystal of silicon, with the capability of performing a complete electronic circuit function. The most promising applications of functional devices are in digital circuits and systems where they provide potential reliability, cost, size, and weight advantages over conventional circuit techniques. (Author)

AD-288 571 Div. 8, 17
(TISTE/CAM) OTS price $7.60

Melpar, Inc., Falls Church, Va.
MOLECULAR CIRCUIT DEVELOPMENT.
Quarterly rept. no. 10, 15 Aug-15 Nov 62,
by Wilbur T. Layton. 15 Nov 62, 77p. incl. illus. tables, 9 refs.
(Contract NOw 60-0362-c)
Unclassified report

DESCRIPTORS: *Molectronics, *Dielectric films, *Electronic circuits, *Microminiaturization (Electronics), *Semiconducting films, Dielectric properties, Silicon compounds, Germanium, Intermetallic compounds, Refractory materials, Thickness, Temperature, Vacuum apparatus, Pyrolysis, Thin films, Electrical properties, Crystals, Growth, Oxides, Nitrides, Cadmium compounds, Tellurides, Selenides, Sulfides, Indium compounds, Antimonides, Vapor plating, Electric fields, Thin films.

The use of a new apparatus has resulted in obtaining both uniform films and crystallites. It was determined that intermediate substrate temperatures (1050 -1100 C) will lead to uniform silicon films if certain conditions are met. The study of the effects of post-deposition heat treatment on sputtered III-V compounds was continued. Numerous arsenide films were sputtered and their electrical properties examined. Work was begun on the sputtering of silicon carbide. The films obtained varied greatly in their properties. The thickness dependence of the dielectric constants of films of CeO2, SiO2, and Si3N4, was investigated. Films of CeO2 and SiO2 showed the dielectric anomaly. Films of

numerous materials were vacuum deposited. Films of lead and cadmium sulfide, selenide and telluride, zinc oxide and sulfide, and tin oxide were formed. Many all-deposited, layered field effect devices were formed and, their characteristics determined. Significant improvement in device parameters was achieved. Voltage-amplification factors as high as 600 were obtained. Tunnel diodes were formed in silicon crystallites. (Author)

AD-288 608 Div. 8, 25
(TISTP/GRW) OTS price $4.60

Goettingen U. (Germany).
''ABSORPTION AND TRANSMISSION, OF ELECTROMAGNETIC WAVES'' PHASE K: MULTILAYER ABSORBER.
Technical (Final) rept.,
by H. W. Helberg and C. Wunsche. 30 Sep 62, 39p. incl. illus. table, 6 refs.
(Contract AF 61(052)154)
(RADC TDR 62-529) Unclassified report

DESCRIPTORS: *Electromagnetic waves, *Microwave equipment, *Magnetic materials, Dielectrics, Damping, Wave transmission, Attenuation, Foils, Impedance, Magnetic susceptibility, Broadband, Absorption.

The equations for the reflection coefficient of a three layer absorber contain 15 free parameters. Input impedance diagrams of three layer absorbers were calculated. By variation of certain parameters a favorable course of the reflection coefficient was aspired. With a thickness of layer d = 0.21 times lambda (maximum) the reflection coefficient of the absolute value of r remains below 13%, all at smaller wavelengths. The bandwith for the absolute value of r less than or equal to 10% is 1:2.5. This absorber contains three layers. For the experimental realization of such absorbers, homogeneous mixtures of paraffin and carbonyl iron powder and regular arrangements of damping cylinders in a non-dissipative dielectric are used. Free field measurements produced a bandwith of 1:2.28 for the absolute value of r less than or equal to 10% in the most favorable case. The necessary thickness of layer was d approximately 0.25 times lambda (maximum). At small wavelengths the efficiency of the absorber is determined by the properties of the first layer only. (Author)

AD-288 612 Div. 8
(TISTP/TL) OTS price $8.10

North Carolina State Coll., Raleigh.
PHASE LAG COMPENSATION OF A-C FEEDBACK CONTROL SYSTEMS.
Master's thesis,
by Joseph Richard Lucas, Jr. 1962, 82p. incl. illus. 21 refs.
Unclassified report

DESCRIPTORS: *Feedback, *Control systems, *Alternating current, *Electrical networks, Errors, Signals, Servomechanisms.

The asserted a-c lag network limitations are investigated and certain possible solutions in view of the investigation results are proposed. (Author)

AD-288 632 Div. 8
(TISTE/CRJ) OTS price $1.60

Army Electronics Research and Development Lab., Fort Monmouth, N. J.
AN APPROACH TO MORE ACCURATE RELIABILITY ANALYSES OF TRANSISTORS,
by Bernard Reich. Aug 62, 5p. incl. illus. tables, 7 refs. (AERDL technical rept. no. 2295)
Unclassified report

DESCRIPTORS: *Transistors, *Reliability, *Semiconductors, Life expectancy, Temperature, Storage, Tests, Test methods.

There has been a reported lack of correlation between results of operating and storage life tests ever since the commencement of such tests. A particular transistor characteristic, thermal resistance, is discussed which may in part explain the lack of correlation previously noted in these life tests. The values of thermal resistance as measured by a technique utilizing current gain as the temperature sensitive parameter and variations of this parameter with applied bias are indicated. (Author)

AD-288 679 Div. 8
(TISTW/RD) OTS price $9.60

Carlyle Barton Lab., Johns Hopkins U., Baltimore, Md.
A NONLINEAR FILTER FOR IMPROVEMENT OF SIGNAL DETECTABILITY IN THE PRESENCE ON NON-GAUSSIAN NOISE,
by Robert H. Richard. Oct 62, 115p. incl. illus. 14 refs. (Technical rept. no. AF-98)
(Contract AF 33(616)6753) Unclassified report

DESCRIPTORS: *Radio signals, *Radiofrequency filters, *Noise (Radio), Nonlinear systems, Radio interference, Detection, Signal-to-noise ratio, Reduction.

A nonlinear filter is investigated and its effectiveness in improving signal detectability in the presence of certain types of non-Gaussian noise is determined. The filter consists of a zero-memory nonlinear device followed by a low-pass filter, the nonlinear device being designed on the basis of only the first-order statistics of the interfering noise and of the sum of signal and noise. The class of noise used in the study is that obtained by passing Gaussian noise through a zero-memory nonlinear element. Because of this the non-Gaussian process can still be characterized by relatively few parameters. The results of the study indicate that, when the noise probability density function is sufficiently different from Gaussian, a considerable improvement in detection reliability can be obtained. When the noise is Gaussian the filter reduces to a linear one. (Author)

AD-288 694 Div. 8, 6
(TISTP/WH) OTS price $1.60

Electrical Engineering Research Lab., U. of Illinois, Urbana.
INVESTIGATION OF MICROWAVE DUPLEXER SWITCHING MECHANISMS.
Quarterly progress rept. no. 13, 1 Apr-30 June 62.
15 Sep 62, 10p. incl. illus.
(Contract DA 36-039-sc-78313, Proj. 3-99-15-104)
Unclassified report

DESCRIPTORS: *Radar duplexers, *Microwave equipment, *Switching circuits, *Plasma physics, *Gases, *Microwaves, *Wave transmission, Nitrogen, Molecules, S band, Temperature, Sound, Low pressure research.

Further information regarding the nature of longitudinal waves produced in low pressure gases by a high intensity electromagnetic field of microwave frequency is reported. The waves are set up in a gas which is contained within a glass tube, the end of which extends into an S Band waveguide through a hole cut in the E plane of the waveguide. A magnetron produces high power 1 micron sec pulses which travel down the waveguide and set up a plasma within the tube for some distance

outside of the waveguide. After a short time delay (tau > 10 microns sec) two distinct perturbations are observed to travel in this plasma down the tube away from the waveguide. It is observed that the velocity of these waves is increased when the electrons are heated in the region through which they are passing, but, if the neutral gas itself is heated, the velocity is unchanged, although the time delay between the microwave pulse and the appearance of the waves is shortened. It is also demonstrated that the waves will propagate through a region of the discharge tube from which no light is being emitted. (Author)

AD-288 708 Div. 8
(TISTW/RD) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CONCERNING THE DEPENDENCE OF THE BREAKDOWN TIME AND THE BREAKDOWN VOLTAGE OF DIELECTRICS ON THEIR THICKNESS,
by A. A. Vorob'yev, G. A. Vorob'yev and V. A. Kostrygin. 8 May 62, 6p. (Trans. no. FTD-TT-62-300 from Izvestiya Akademii nauk SSSR. Energetika i avtomatika, No. 2, pp. 62-64, 1961)
Unclassified report

DESCRIPTORS: *Dielectrics, Electric discharges, USSR.

AD-288 714 Div. 8
(TISTW/RD) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A DEVICE FOR ELECTRICAL BEAM CONTROL OF PENCIL-BEAM LINEAR AND SURFACE ANTENNA ARRAYS,
by L. N. Deryugin. 19 July 62, 3p. (Trans. no. FTD-TT-62-755 from Soviet Patent No. 138974 (662481/26), 11 Apr 60)
Unclassified report

DESCRIPTORS: *Antennas, *Antenna radiation patterns, Waveguides, USSR, Control.

AD-288 725 Div. 8
(TISTW/RD) OTS price $1.60

Transitron Electronic Corp., Wakefield, Mass.
INDUSTRIAL PREPAREDNESS STUDY FOR DIFFUSED SEMICONDUCTOR DEVICES.
Quarterly rept. for 1 Jan-31 Mar 62,
comp. by L. Ullmann. 31 Mar 62, 10p.
(Contract DA 36-039-sc-72714)
Unclassified report

DESCRIPTORS: *Semiconductors, *Transistors, Silicon, Germanium, Industrial mobilization, Production.

AD-288 739 Div. 8
(TISTW/RD) OTS price $4.60

Sylvania Electric Products, Inc., Emporium, Pa.
(No title).
Interim engineering rept. no. 5, 1 July-30 Sep 61,
by Robert J. Bisso. 30 Sep 61, 24p.
(Contract NObsr-81552)
Unclassified report

DESCRIPTORS: *Miniature electron tubes, *Subminiature electron tubes, *Cathode followers, Miniature electronic equipment, Subminiature electronic equipment, Design.

AD-288 740 Div. 8
(TISTW/RD) OTS price $1.60

Sylvania Electric Products, Inc., Emporium, Pa.
(No title).
Interim engineering rept. no. 6, 1 Oct-29 Dec 61,
by Richard P. McKibben and Robert J. Bisso.
29 Dec 61, 6p.
(Contract NObsr-81552)
Unclassified report

DESCRIPTORS: *Miniature electron tubes, *Subminiature electron tubes, *Cathode followers, Miniature electronic equipment, Subminiature electronic equipment.

AD-288 741 Div. 8
(TISTW/RD) OTS price $1.60

Sylvania Electric Products, Inc., Emporium, Pa.
(No title).
Interim engineering rept. no. 7, 1 Jan-31 Mar 62,
by Robert J. Bisso and William S. Snyder.
31 Mar 62, 9p.
(Contract NObsr-81552)
Unclassified report

DESCRIPTORS: *Miniature electron tubes, *Subminiature electron tubes, *Cathode followers, Miniature electronic equipment, Subminiature electronic equipment, Design.

AD-288 769 Div. 8, 7
(TISTW/RD) OTS price $3.60

Kidde Electronics Labs., Walter Kidde and Co., Inc., Clifton, N. J.
GENERAL USAGE FUNCTIONAL ASSEMBLIES.
Final rept., 1 July 60-28 Feb 62.
15 Mar 62, 13p.
(Contract NObsr-81323)
Unclassified report

DESCRIPTORS: *Power supplies, Manufacturing methods, Semiconductors, Electronic equipment.

AD-288 785 Div. 8
(TISTM/TCG) OTS price $1.10

Litton Industries, San Carlos, Calif.
ANALYSIS OF TYPE 1DP11 CATHODE RAY TUBE EVALUATING MECHANICAL AND ELECTRICAL PERFORMANCE.
3 Aug 62, 3p.
(Contract AF 33(600)41344)
Unclassified report

DESCRIPTORS: *Cathode ray tubes, *Deflection, *Sensitivity, *Magnetic fields, *Shielding, Electrical properties, Focusing.

AD-288 789 Div. 8
(TISTM/TCG) OTS price $1.60

Knights, James, Co., Sandwich, Ill.
HIGH PRECISION MINIATURE CRYSTAL UNITS 4.3 TO 20 mc.
Progress rept. no. 6, Jan-Mar 62.
Mar 62, 16p.
(Contract DA 36-039-sc-75974)
Unclassified report

DESCRIPTORS: *Miniature electronic equipment, *Crystal holders, *Frequency, Measurement, Resonance, Adapters, Specifications.

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-288 804 Div. 8
(TISTP/WH) OTS price $4.60

Microwave Associates, Inc., Burlington, Mass.
RUGGEDIZED MICROWAVE DUPLEXING TUBES PRODUCTION ENGINEERING MEASURES PROGRAM.
Quarterly progress rept. no. 2, 12 June-12 Sep 62, by Paul Basken. 12 Sep 62, 39p. incl. illus. tables.
(Contract DA 36-039-sc-85987)
Unclassified report

DESCRIPTORS: *Transmit-receive tubes, *Radar duplexers, *Electronic switches, *Manufacturing methods, Microwave equipment, Broadband, X band, Electron tubes, Switching circuits, Glass, Waveguide windows.

The design of the JAN 1B63A, 6164, 6334 and a broadband X-band crystal protector TR tube to operate at temperatures of 350 C for a given time period and still meet the electrical test requirements has been the objective of this quarter of the program. Performance of the present design utilizing 7070 glass windows, dual gas fill and specially treated walls indicates a good possibility for obtaining the objectives of the program. Life tests indicate that the ruggedized tubes will operate satisfactorily for 2000 hours at room temperature and for at least 100 hours at 350 C. (Author)

AD-288 822 Div. 8, 26
(TISTE/CRJ) OTS price $6.60

RCA Defense Electronic Products, Camden, N. J.
MICRO-MODULE PRODUCTION PROGRAM.
Formal engineering report on Development of Microelement Inductors.
14 Sep 62, 1v. incl. illus. tables.
(Contract DA 36-039-sc-75968)
Unclassified report

DESCRIPTORS: *Radiofrequency coils, *Microminiaturization (Electronics), *Radio communication systems, *Manufacturing methods, Materials, Reliability, Ferrites, Processing, Temperature, Production, Magnetic cores, Test equipment, Measurement, Intermediate frequency transformers, Radiofrequency transformers, Inductance, Power amplifiers, Modulators, Vibration, Shock resistance, Costs.

Efforts were continued on microelement inductors for the AN/PRC-51 equipment. Improved inductor capability was successfully demonstrated by the production of various cores and inductors having the specified characteristics over the frequency range from 450 kc to 50 mc. A high degree of stability was accomplished, and over-all performance of the inductors met the requirements of module transistorized circuitry of AN/PRC-51 equipment. Reliability tests proved that microelement inductors are capable of a high level of performance. These components proved their capability under test conditions of extreme severity, and demonstrated a high order of reliability in Micromodule circuits operated under load-life test conditions. The inductor stability achieved in respect to temperature, extreme magnetic fields, and dc bias currents represents a major accomplishment in inductor micro-circuitry. Inductors suitable for all the specified module applications were produced and successfully demonstrated. Temperature stability requirements and drive sensitivity needs of 0.2-% were satisfied. Coil designs suitable for 4.3-mc IF and 50-mc RF module applications were developed. (Author)

AD-288 834 Div. 8
(TISTE/OHD) OTS price $1.60

System Development Corp., Santa Monica, Calif.
TUNNEL DIODE PULSE CIRCUITS,
by Stan Stern. 25 July 62, 16p. incl. illus. 7 refs. (Rept. no. SP-902)
Unclassified report

DESCRIPTORS: *Diodes, *Pulse generators, Mathematical analysis, Oscillator circuits, Switching circuits, Trigger circuits, Semiconductors.

A survey is given on the application of tunnel diodes to pulse circuits. It contains a brief description of the tunnel diode characteristics and properties and a survey of tunnel diode circuit applications. Analytical and experimental information explaining the characteristics of the device and its use in pulse circuits is included. (Author)

AD-288 846 Div. 8
(TISTP/GRW) OTS price $1.10

Electrical Engineering Research Lab., U. of Texas, Austin.
RESEARCH ON ELECTROMAGNETIC WAVE PROPAGATION EFFECTS IN DYNAMIC SITUATIONS.
Quarterly engineering rept. no. 2, 1 Aug-31 Oct 62.
31 Oct 62, 3p.
(Contract AF 33(657)8716, Proj. 4062)
Unclassified report

DESCRIPTORS: *Radio signals, Water vapor, Oxygen, Extremely high frequency, Absorption, Atmosphere, Dynamics, Attenuation.

Measurements of three types were made: (1) radiometric, (2) free space propagation, and (3) absorption cells. Each type of measurement between 100 and 160 kmc provides data unique from the data of the other two types. The objective of the measurements is to provide data that can be used to determine the interdependence of oxygen and water vapor absorption and to evaluate the propagation and emission characteristics of frequencies between 100 and 160 kmc in the earth's atmosphere. (Author)

AD-288 874 Div. 8
(TISTE/OHD) OTS price $6.60

Armour Research Foundation, Chicago, Ill.
EXCESS NOISE IN SEMICONDUCTORS.
Annual summary rept. no. 7, 15 Nov 61-14 Nov 62, by James J. Brophy. 14 Nov 62, 1v. incl. illus. 20 refs.
(Contract Nonr-180000, Proj. NR 017-432)
Unclassified report

DESCRIPTORS: *Noise (Radio), *Semiconductors, Ferroelectric crystals, Absorption, Optics, Glycerols, Sulfates, Polarization, Temperature, Hyperfine structure, Transistors, Tungsten, High temperature research, Germanium, Interferometers.

Critical point polarization fluctuations in ferroelectric triglycene sulfate crystals were measured at the curie temperature by observing noise voltages between electrodes applied to the crystal. In barium titanate crystals a thermal Barkhausen noise with a 1/f power spectrum is observed when the crystal temperature is passed slowly through the curie point. Experimentally it was found that the noise voltage appearing across a metallic conductor heated to high temperatures by dc current flow is given by the Nyquist theorem, even though the conductor is

not in thermodynamic equilibrium. In semiconductors fluctuations in optical absorption at wavelengths beyond the fundamental absorption edge caused by free carrier scattering are expected. A simple experiment employing an infrared interferometer was capable of detecting such fluctuations in optical absorption. (Author)

AD-288 895 Div. 8
(TISTP/FR) OTS price $2.60

Sperry Phoenix Co., Ariz.
ADAPTIVE RELIABILITY TECHNIQUES.
Quarterly rept. no. 1,
by E. R. Tribken. July 61, 17p. incl. illus. table (Rept. no. LJ-1262-0106)
Unclassified report

DESCRIPTORS: *Electronic equipment, *Control systems, *Reliability.

The design requirements for a system with adaptive reliability are defined. The problem areas and methods which can be used to solve these problems are outlined. At least two possible methods of solution exist for each problem area. The concept of energy correlation is introduced as a powerful technique to provide fail-passive design. (Author)

AD-288 917 Div. 8, 25
(TISTP/JW) OTS price $.75

Flight Accessories Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
THERMAL ANALYSIS OF A SUPERCONDUCTING GENERATOR.
Final rept., Feb-July 62 on Power Conversion and Transmission Technology,
by Robert J. Smith. Oct 62, 17p. incl. illus. tables, 3 refs.
(Proj. 8128)
(ASD TDR 62-811) Unclassified report

DESCRIPTORS: *Thermodynamics, *Generators, Cryogenics, Heat transfer, Boundary layer, Superconductors.

The investigation was undertaken to establish heat transfer design data for a superconducting generator. An analysis was made of heat transfer via various leakage paths into the generator. Further, a method of computing the heat input from the load-connecting electrical leads was devised. The result was a set of calculations for one design and a method of optimizing the conductor for minimum heat transfer. (Author)

AD-288 922 Div. 8, 25, 20
(TISTP/JW) OTS price $1.60

Aerospace Corp., El Segundo, Calif.
DIRECT MEASUREMENTS OF RECOMBINATION RATES IN A SHOCK TUBE,
by T. A. Jacobs, R. A. Hartunian and others.
30 Sep 62, 10p. incl. illus. 7 refs. (Rept. no. TDR-169(3230-10)TN-1)
(Contract AF 04(695)169)
(SSD-TDR 62-139) Unclassified report

DESCRIPTORS: *Shock tubes, *Fluid flow, *Recombination reactions, Measurement, High temperature research, Gas diffusion, Spectrographic analysis.

By an extension of the ideas embodied in the single-pulse shock tube, a technique was developed which allows the direct measurement of recombination rates of many atomic species at high temperature. In the present technique, the expansion chamber is located a few tube diameters from the shock tube end plate rather than at the high-pressure end as in the conventional single-pulse shock tube. A cylindrical diaphragm, lying flush with the inside diameter of the tube, is used to control the time of initiation of an expansion wave. Experimental observation has shown that the present technique increases the gas expansion rate by an order of magnitude. The one-dimensionality of the flow at the shock tube end wall was also investigated. The technique developed in conjunction with the spectroscopic means of observation was employed to gain preliminary measurements of the recombination rate of atomic chlorine. (Author)

AD-288 924 Div. 8, 30, 2
(TISTP/GRW) OTS price $2.60

Rome Air Development Center, Griffiss Air Force Base, N. Y.
H-F PROPAGATION SIMULATION,
by R. Mather and F. Wilson. Nov 62, 21p. incl. 6 refs. (Rept. no. RADC TDR 62-473)
(Proj. 5582)
Unclassified report

DESCRIPTORS: *Electromagnetic waves, *Ionospheric propagation, *Echo ranging, High frequency, Wave transmission, Analog computers, Electrons, Density, Partial differential equations, Simulation.

An experiment is described in which high frequency electromagnetic wave propagation is to be simulated on an analog computer and compared with experimental data collected over a 3800-km path. The experimental complex consists of a transmitter site located in the Panama Canal Zone and a receiver site at Stockbridge, NY. Vertical ionospheric sounders are located along the transmission path and are used to measure the spatial distribution of electron density in the volume of interest. A method is described whereby this spatial distribution of electron density is programmed into the analog computer in order that the Hamiltonian equations describing ray paths may be solved. In addition to producing frequency vs time plots for comparison with the experimental data, the simulator also gives results not easily measured in the field, such as take-off angle, angle of arrival, group time, phase time, off-path deviation, and height of reflection. An alternate use for the simulator is also presented. By rescaling the problem and making use of its capability to generate functions of three variables, one can examine the effects of small-scale irregularities of ionization on electromagnetic waves. (Author)

AD-288 935 Div. 8, 25
(TISTM/BRW) OTS price $2.60

General Telephone and Electronics Labs., Inc., Bayside, N. Y.
STUDIES OF ELECTRON TUBE MATERIALS AND THERMIONIC EMISSION PROCESSES.
Scientific rept. no. 10, 1 July-30 Sep 62,
by John V. Florio and T. G. Polanyi. 30 Sep 62, 17p. incl. illus. (Rept. no. TR 62-704-104-204-208.21)
(Contract AF 19(604)7286, Proj. 4619)
(AFCRL 62-905) Unclassified report

DESCRIPTORS: *Thermionic emissions, *Oxide cathodes, *Electron tubes, Cathodes (Electron tubes), Diodes, Materials, Nickel, Barium compounds, Oxides, Tantalum, Platinum, Chemical reactions, Mass spectroscopy, Barium, Evaporation, Coatings, Sublimation, Impurities, Molybdenum, Thin films.

A comparison of the emission properties of pure-Ni base cathodes with cathodes containing known impurities in either the base metal or the

coating permitted a more critical evaluation of the effects of the impurities on emission. The slow activation of the W-Ni base oxide cathodes and the enhancement of emission with successive high-temperature processing treatments (increased reaction between W and the oxide) are in sharp contrast to results obtained with the binder. Electrolytic activation of an oxide cathode by drawing plate current has usually been ascribed to electrolytic dissociation of the cathode coating, evaporation of oxygen, and activation by the excess Ba residue. The results obtained on a special tube with movable anodes indicate that, under electron bombardment, evaporation of Ba from the anode back to the cathode is responsible for activation. The sublimation from a Ta-base oxide cathode has been measured as a function of cathode temperature. The sublimate is predominantly atomic Ba and the sublimation rates are considerably greater than those found for the Pt, pure Ni or N4 Ni cathodes. The Ta base cathode can thus be used as a convenient controlled source of Ba atoms in the study of cathode coating activation. (Author)

AD-288 949 Div. 8, 26
(TISTE/OHD) OTS price $5.60

Pacific Semiconductors, Inc., Lawndale, Calif.
PRODUCTION ENGINEERING MEASURE: TRANSISTOR, VHF, SILICON, POWER (5W-70MC)
Quarterly rept. no. 4, 1 Mar-31 May 62,
by R. Clarke, M. Preletz and W. M. Wilson.
31 May 62, 1v. incl. illus. tables (PSI rept. no. TE 4000:15-Q-4)
(Contract DA 36-039-sc-85960)
Unclassified report

DESCRIPTORS: *Transistors, Transistor amplifiers, Power amplifiers, Very high frequency, Radiofrequency oscillators, Test equipment, Test methods, Manufacturing methods, Temperature, Production, Radiofrequency power.

Progress is reported on the 5 watt - 70 mc transistor. The electrical data on 100 transistors is presented and discussed. Continuous pilot line operation was established at a rate sufficient to fabricate the preproduction sample transistors. Process improvement through the use of yield charts was the major effort in the pilot line operation. Modifications of assembly equipment toward higher rate capability were completed. (Author)

AD-288 950 Div. 8
(TISTW/RD) OTS price $1.60

Transitron Electronic Corp., Wakefield, Mass.
PRODUCTION ENGINEERING MEASURE ON SILICON HIGH FREQUENCY POWER TRANSISTOR.
Quarterly rept., 1 Jan-31 Mar 62,
by D. Mac Kinnon. 31 Mar 62, 8p.
(Contract DA 36-039-sc-81286)
Unclassified report

DESCRIPTORS: *Transistors, Production, High frequency, Silicon.

AD-288 963 Div. 8, 1, 12
(TISTW/RD) OTS price $2.60

Dunlap and Associates, Inc., Stamford, Conn.
AN ELECTRONIC PREDICTOR INSTRUMENT,
by A. George Berbert and Charles R. Kelley.
1962, 23p.
(Contract Nonr-282200)
Unclassified report

DESCRIPTORS: *Display systems, *Control, *Aircraft, *Satellite vehicles, Human engineering, Switching circuits, Cathode ray tubes, Instrumentation, Control systems.

AD-288 964 Div. 8, 23
(TISTW/RD) OTS price $2.60

American Inst. for Research, Pittsburgh, Pa.
CORE TRAINING FOR ELECTRONIC MAINTENANCE: PRINCIPLES AND TECHNIQUES,
by Richard O. Peterson, Edna M. Jones, and Douglas S. Ellis. Nov 57, 21p. (Technical memo. no. ML-TM-57-2)
(Contract AF 18(600)1351, Proj. no. 7729)
Unclassified report

DESCRIPTORS: *Electronic equipment, *Maintenance, *Maintenance personnel, Airborne, Jet fighters, Air force equipment, Training, Electronic equipment.

AD-288 965 Div. 8, 30
(TISTW/RD) OTS price $8.60

American Electronics, Inc., Los Angeles, Calif.
APPENDIX TO PROCEEDINGS: SYNCHRO DESIGN AND TESTING SYMPOSIUM, 17 AND 18 MARCH 1960 HELD AT THE DEPARTMENT OF COMMERCE AUDITORIUM, SPONSORED BY DEPARTMENT OF THE NAVY, BUREAU OF NAVAL WEAPONS, WASHINGTON, D. C.
1959, 93p.
Unclassified report

DESCRIPTORS: *Symposia, *Synchros, Test equipment, Tests, Naval equipment.

AD-288 989 Div. 8, 25
(TISTW/PCR) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AN EXPERIMENTAL STUDY ON THE MAKING OF MULTICOMPONENT ELECTROLUMINESCENCE DEVICES USING FERROELECTRIC MATERIALS,
by I. Ya. Lyamichev, I. N. Orlov and others.
11 May 62, 13p. (Trans. no. FTD-TT-62-305 from Izvestiya Akademii Nauk SSSR, Seriya Fizicheskaya, vol. 25, No. 4, pp. 492-500, 1961)
Unclassified report

DESCRIPTORS: *Luminescence, *Ferroelectric materials, USSR, Image intensifiers (Electronics), Photoconductivity, Electronic circuits, Amplifiers.

AD-288 993 Div. 8
(TISTW/RD) OTS price $2.60

Electro-Optical Systems, Inc., Pasadena, Calif.
TUNNEL EMISSION AMPLIFIER INVESTIGATION.
Interim engineering rept. for 1 Oct 61-30 Jan 62,
by L. E. Godycki. 30 Jan 62, 19p. (EOS rept. no. 2060-Q-1)
(Contract AF 33(657)7631)
Unclassified report

DESCRIPTORS: *Thin films, *Diodes, *Triodes, *Radiofrequency amplifiers, Tantalum, Aluminum, Oxides, Dielectric films, Manufacturing methods, Electron tubes.

AD-288 994 Div. 8
(TISTW/RD) OTS price $3.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
CARRIER MULTIPLICATION IN Ge AT X-BAND,
by S. J. Freedman. 27 Feb 62, 26p. (Research rept. no. PIBMRI 995-62)
(Contract AF 18(600)1505)
(AFOSR 2652) Unclassified report

DESCRIPTORS: *Waveguides, Waveguide filters, Radiofrequency filters, Germanium, Frequency multipliers, Impurities, Solid state physics, X band.

AD-288 995 Div. 8
(TISTW/RD) OTS price $1.60

Whirlpool Corp., St. Joseph, Mich.
THERMOELECTRIC TEMPERATURE CONTROL IN AN/URQ-9 FREQUENCY STANDARD.
Interim development rept. no. 5, 1 May-31 July 62,
by A. L. Wennerberg. 10 Aug 62, 13p.
(Contract NObsr-85314)
Unclassified report

DESCRIPTORS: *Temperature control, *Radio-frequency, *Standards, Crystal ovens.

AD-288 999 Div. 8
(TISTW/RD) OTS price $1.60

Chatham Electronics Div., Tung-Sol Electric, Inc., Livingston, N. J.
PRODUCTION ENGINEERING MEASURE FOR TYPE 7890 SUPER POWER HYDROGEN THYRATRON.
Quarterly progress rept. no. 1, 7 Mar-7 June 62,
by C. L. Shackelford. 7 June 62, 19p.
(Contract DA 36-039-sc-85984)
Unclassified report

DESCRIPTORS: *Thyratrons, Electron tubes, Production, Design, Stainless steel, Hydrogen.

AD-289 014 Div. 8
(TISTP/WH) OTS price $7.60

Reconnaissance Systems Lab., Mountain View, Calif.
INTERCEPT SYSTEM DYNAMIC RANGE ENHANCEMENT.
Technical note. no. 1,
by Richard J. Powell. Sep 62, 65p. incl. illus. 10 refs. (Rept. no. 62R81)
(Contract AF 30(602)2721)
(RADC TDR 62-475) Unclassified report

DESCRIPTORS: *Parametric amplifiers, *Microwave amplifiers, *S band, *Traveling wave tubes, *Radar receivers, *Radio receivers, *Tuned circuits.

The dynamic range of parametric devices is investigated. A computer study has been in process which will allow exhaustive analysis of the dynamic range of single- and double-pumped parametric amplifiers. An S-band parametric amplifier was designed and built to allow experimental verification of the theoretical results being derived. A signal frequency of 3Gc and a pump frequency of 10Gc were employed. The parametric upper-sideband up-converter is studied, a large signal analysis is employed, and equations showing the large signal behavior, saturation level, and dynamic range are derived. The equations derived indicate the parameter choices which should be made to optimize the dynamic range. The dynamic range (non-optimum) of a typical parametric up-converter is calculated, using exact and approximate methods, and the results are satisfactory. (Author)

AD-289 021 Div. 8, 26
(TISTE/OHD) OTS price $4.60

Western Electric Co., Laureldale, Pa.
PRODUCTION ENGINEERING MEASURE. DIFFUSED SEMICONDUCTOR DEVICES 7, 12 PLUS 2N559 AND 2N1094.
Quarterly progress rept. no. 20, 10 June-10 Sep 62,
by M. N. Reppert. 10 Sep 62, 41p. incl. illus.
(Contract DA 36-039-sc-72729)
Unclassified report

DESCRIPTORS: *Transistors, *Manufacturing methods, *Semiconductors, Machines, Processing, Tools, Welding, Bonded joints, Bonding, Electric wire, Seals, Cleaning, Drying ovens, Production, Quality control, Data processing systems, Guided missiles (Surface to air).

Three machines were completed: The wafer breaking, screening, and loading machine and wire bonding machine no. 2 completed shop trial only; platform lead welding machine no. 2 completed prove-in as well as shop trial. A clutch-brake was modified to avoid a wear problem. Wire bonding machine no. 2 attained a mechanical yield of 96% during shop trial. The piece part cleaning and the header assembling machines continued in shop trial. The parts drying problem on the piece part cleaning machine was corrected. A fouling problem was encountered on the glassing molds. It was caused by the glass slug feeding station. The card loading machine was attached to the 2N559 testing and date stamping machine and was then power driven for the first time. The closure welding machine advanced from construction. Effort was continued on the switching time modules of the data handling system. The can getter machine design was completed and construction was continued.

AD-289 027 Div. 8, 7
(TISTA/SEB) OTS price $1.10

Aerospace Information Div., Washington, D. C.
SOVIET RECOMPUTATION OF THE LATERAL PHOTOVOLTAIC EFFECT.
8 Nov 62, 3p. incl. illus. (AID rept. 62-184; Trans. from Radiotekhnika i Elektronika 7:7, pp. 1196-1205, 1962; Electronics 30:7, pp. 165-167, 1 July 57; Jnl. of Applied Physics 31:6, pp. 1089-1095, June 60)
Unclassified report

DESCRIPTORS: *Photoelectric effect, Theory, USSR, Translation, Voltage, Photoelectric cells.

AD-289 034 Div. 8
(TISTP/GRW) OTS price $4.60

Airtron, Inc., Morris Plains, N. J.
DEVELOPMENT OF A FERRITE MATERIAL FOR A HIGH POWER PHASE SHIFTER AT S-BAND.
Interim development rept. no. 2, 18 July-18 Oct 62.
9 Nov 62, 29p. illus. tables, 3 refs. (Rept. no. R11-404)
(Contract NObsr-87388)
Unclassified report

DESCRIPTORS: *Phase shifters, *Ferromagnetic materials, *Ferrites, Microwave equipment, Radiofrequency power, Nickel compounds, Preparation, Design, Operation, S band, Manufacturing methods.

Additional compositions in the system NiF e2-(x + y)Al sub x Ga sub y O4 were evaluated. Various experiments were performed to explain the high loss, high saturation magnetization and high Curie temperatures obtained on some samples. Loss tangents of less than .003 were obtained on several samples at 20 mc and at S-band. A tan of .004 was obtained on one hot pressed sample. It was concluded that the high loss values obtained on the sintered samples were due to absorbed water introduced in the sample during previous porosity and density measurements and not completely removed before measuring tan. The high saturation and high Curie temperatures obtained in the hot pressed samples appear to be caused by incomplete reaction. Annealing experiments were found to confirm hypothesis. The higher than expected saturation magnetizations observed on some conventionally processed samples may be the result of a change in site preference of aluminum in the presence of gallium. Further experiments to establish this are discussed. (Author)

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-289 081 Div. 8
(TISTP/FR) OTS price $4.60

General Electric Co., Schenectady, N. Y.
PRODUCTION ENGINEERING MEASURE FOR VOLTAGE-TUNABLE MAGNETRONS.
Quarterly progress rept. no. 1, 18 Apr-18 July 62,
by W. M. Piwnica. 19 Sep 62, 40p. incl. illus. tables.
(Contract DA 36-039-sc-86722)
Unclassified report

DESCRIPTORS: *Magnetrons, Design, Manufacturing methods, Tests, Vacuum systems, Brazing, Noise (Radio), Filaments, Anodes (Electron tubes), Cathodes (Electron tubes).

The G-E developmental types Z-5364 and ZM-6001 voltage-tunable magnetron packages are described. The modifications performed on the two package types and the original basic tube design are given. The main tube design modification is in the cold cathode structure. The design changes incorporated into both types of packages include improved bowl-magnet design with magnet compensating material, ceramic and cavity material modification, pole piece redesign, and cup assembly improvement. Operational planning for the project was initiated and is described. Preliminary work plans and goals for the program are listed. (Author)

AD-289 084 Div. 8
(TISTW/RD) OTS price $10.10

Electrical Engineering Research Lab., U. of Illinois, Urbana.
THE BACKFIRE BIFILAR HELICAL ANTENNA,
by Willard Thomas Patton. Sep 62, 112p. incl. illus. table, 23 refs. (Technical rept. no. 61)
(Contract AF 33(657)8460, Proj. 6278)
Unclassified report

DESCRIPTORS: *Helical antennas, Polarization, Antenna radiation patterns, Numerical analysis.

The backfire bifilar helical antenna, consisting of two opposed helical wires fed with balanced currents at one end, is a new type of circularly polarized antenna. When operated above the cutoff frequency of the principal mode of the helical waveguide, the bifilar helix produces a beam directed along the structure toward the feed point. The term backfire is used to describe this direction of radiation in contrast with endfire which denotes radiation away from the feed point. Radiation patterns, measured for a wide range of helix parameters, show maximum directivity slightly above the cutoff frequency. The pattern broadens with frequency and, for pitch angles near 45 degrees, the beam splits and scans toward the broadside direction. Near field measurements show the current decaying rapidly to a level about twenty decibels below the input level at a rate that increases with frequency. Phase measurements in the near field show that in the feed region the direction of phase progression is toward the feed point. The oppositely directed phase progression and direction of energy flow is characteristic of a backward wave. The direction of phase progression is consistent with the backfire direction of the main beam observed in the radiation patterns and the increasing rate of current decay is consistent with the broadening of the main beam with increasing frequency. (Author)

AD-289 085 Div. 8
(TISTP/WH) OTS price $2.60

Electrical Engineering Research Lab., U. of Illinois, Urbana.
ON THE MAPPING BY A CROSS-CORRELATION ANTENNA SYSTEM OF PARTIALLY COHERENT RADIO SOURCES,
by Robert H. MacPhie. Oct 62, 23p. incl. illus. 9 refs. (Technical rept. no. 62)
(Contract AF 33(657)8460, Proj. N6278)
Unclassified report

DESCRIPTORS: *Antennas, *Fourier analysis, *Electronic scanners, *Radio signals, *Wave analysis.

It is shown that by means of a cross-correlation antenna system it is possible to measure the mutual coherence function T(u,v) of a distribution of partially coherent radio sources. The two linear antennas of the system are scanned independently to give a two-dimensional output. Although the analysis considers only one dimensional linear antenna it can be extended to two dimensional planar antennas in a straightforward manner. (Author)

AD-289 271 Div. 8
(TISTP/FR) OTS price $1.10

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
COMPUTER CONTROL OF AN ANALOG VOCAL TRACT,
by Jack B. Dennis. 1962, 8p. incl. illus. 4 refs.
(Contract AF 19(604)6102)
Unclassified report

DESCRIPTORS: *Speech, Synthesis, Instrumentation, Digital computers, Simulation.

DAVO is a dynamic analog of the vocal tract and consists of two parts--an electrical model of the human vocal mechanism and a control system for programming utterances. The model of the vocal tract is a lumped constant transmission line analog of the pharyngeal and oral cavities in which the individual inductance and capacitance values can be varied over a range of two decades by control voltages. Each inductance-capacitance section is analogous to a section of acoustical transmission line in which the area and length vary with the inductance and capacitance parameters. To the main transmission line is coupled a secondary electrical line which is analogous to the nasal passages. The first two sections of this secondary line are electrically controlled by a nasal coupling signal, and represent the action of the velum. The remaining sections are fixed as they do not vary significantly during the production of speech sounds. (Author)

AD-289 288 Div. 8, 26
(TISTE/OHD) OTS price $3.60

Sylvania Electric Products, Inc., Woburn, Mass.
PRODUCTION ENGINEERING MEASURE FOR GALLIUM ARSENIDE VARACTOR DIODE.
Quarterly progress rept. no. 1, 1 June-31 Aug 62,
by T. Baker. 31 Aug 62, 30p. incl. illus. tables.
(Contract DA 36-039-sc-86736)
Unclassified report

DESCRIPTORS: *Variable capacitors, *Diodes, *Semiconductors, *Manufacturing methods, Laboratory furnaces, High temperature research, Vacuum systems, Gallium compounds, Arsenides, Thin films, Electric terminals, Resistance, Nickel, Nickel alloys, Tin alloys, Gold alloys, Diffusion, Zinc alloys, Bonding, Production, Industrial production

The equipment necessary for the production of gallium arsenide varactor diodes was installed. Investigations of production techniques were made in the areas of diffusion, contacting, junction formations, bonding and packaging. All studies were directed towards the optimum conditions necessary for high volume production. (Author)

AD-289 289 Div. 8
(TISTP/WH) OTS price $5.60

Washington U., Seattle Coll. of Engineering.
OPTIMUM ANTENNA ARRAY SYNTHESIS IN TERMS OF AZIMUTHAL ANGLE,
by W. P. Harthill and H. M. Swarm. Aug 62, 55p. incl. illus. tables, 2 refs. (Technical rept. no. 66)
Unclassified report

DESCRIPTORS: *Antennas, *Antenna radiation patterns, *Lobing, *Least squares method, *Design, Integral equations, Complex numbers, Azimuth.

The development of an antenna pattern synthesis procedure whereby the desired pattern is synthesized directly in the far field angle of radiation is discussed. The procedure applies to linear antennas with uniform element spacing. For a specified antenna pattern, a specific element spacing and a given number of elements the synthesis procedure yields the individual element current magnitudes and phases. The resulting antenna pattern has a minimum mean squared error with respect to the desired pattern. A measure of design goodness is also developed that is independent of antenna pattern shape and thus allows the comparison of the degree of design success attained with a variety of antenna pattern types. (Author)

AD-289 291 Div. 8
(TISTE/OHD) OTS price $2.60

Westinghouse Electric Corp., Washington, D. C.
HIGH CURRENT AND HIGH VOLTAGE SILICON CONTROLLED RECTIFIERS.
Interim development rept., 29 June-30 Sep 62. 30 Oct 62, 20p. incl. illus. tables.
(Contract NObsr-87646, Proj. SR-0080301)
Unclassified report

DESCRIPTORS: *Rectifiers, *Power, Electric currents, Voltage, Silicon, Crystals, Molybdenum, Aluminum, Boron, Switching circuits, Cooling, Encapsulation, Crystallization, Diffusion, Gold alloys, Antimony, Transients.

A survey of silicon suppliers was completed to determine availability of large diameter, quality material. Results indicate that crucible grown material provides a better source of supply at this time. Device-design studies are well underway and a basic hard-soldered structure is described. Encapsulation design studies indicate that a scaled-up version of capsules now used for high power controlled rectifiers should satisfy mechanical and thermal design considerations. Basic test areas and equipment for performing required evaluations are reviewed. (Author)

AD-289 309 Div. 8, 30, 15
(TISTP/WH) OTS price $2.60

Illinois U., Urbana.
DESIGN OF COMBINATIONAL SWITCHING CIRCUITS USING AN ITERATIVE CONFIGURATION,
by D. L. Epley. 1959, 19p. incl. illus. tables, 12 refs.
(Contract AF 49(638)63)
Unclassified report

Proceedings of the 4th Midwest Symposium on Circuit Theory Marquette University, Milwaukee, Wis. pp. M.1-M.23 December 1959.

DESCRIPTORS: *Computer logic, *Switching circuits, *Electrical networks, *Digital computers, *Circuits.

AD-289 321 Div. 8
(TISTW/RD) OTS price $9.10

Goodyear Aircraft Corp., Akron, Ohio.
ADVANCED ANTENNA DESIGN TECHNIQUES.
Quarterly progress rept. no. 1, 1 June-31 Aug 62, by D. D. Collins and J. C. Bell, Jr. 25 Sep 62, 102p. incl. illus. table (Rept. no. GER 10814)
(Contract DA 36-039-sc-90746, Proj. 3A99-12-001)
Unclassified report

DESCRIPTORS: *Antennas, *Parabolic antennas, *Radomes, *Satellite vehicle antennas, Antenna horns, Reflectors, Design, Satellite vehicles.

System parameter investigation was essentially completed. Tentative parameters and requirements for space vehicle and ground-based antennas which include frequency band grouping, environmental, mechanical and electric requirements are listed. Concept generation is essentially complete. Preliminary evaluation has eliminated certain concepts which were considered excessively complex or uneconomical. Other concepts have been selected for further, more detail evaluation, analysis, and comparison. A breakdown of space vehicle antennas into general usage and mission categories is presented. Also included is a listing of specific types of antennas for review and selection. Certain types which lend themselves to expandable techniques have been selected and specific concepts are presented and described. Preliminary electrical performance evaluations covering antenna gain and efficiency, operational frequencies, frequency bandwidths, pattern beamwidths, side lobe levels, and tolerance effects were made and results are shown. System operation factors including circuit complexity, method of deployment, and structural considerations are also covered. Three general types of ground-based tracking antennas are presented. They include collapsible or foldable rigid structural systems, inflatable systems and foam-rigidized systems. (Author)

AD-289 324 Div. 8, 15, 7
(TISTP/WH) OTS price $5.60

Case Inst. of Tech., Cleveland, Ohio.
SYNTHESIS OF TRANSFER FUNCTIONS USING IMMITTANCE OPERATORS,
by Togan Zeren. 1 May 62, 49p. incl. illus. 14 refs. (Scientific rept. no. 31)
(Contract AF 19(604)3887, Proj. 5635)
(AFCRL 62-320) Unclassified report

DESCRIPTORS: *Transformations (Mathematics), *Electrical networks, *Circuits, *Admittance, *Synthesis, *Polynomials.

The synthesis of transfer functions of 3T Networks is treated using the concept of immittance operators. The operator and its properties are introduced. Then the even part split and Darlington's synthesis and Lewis Method to obtain polynomial with positive coefficients are described. These ideas are applied to synthesize a given driving point admittance with specified transfer function zeros. The variation of even part split, methods to determine the scaling constants and the complementary networks are

described. These methods are used to synthesize transfer functions with arbitrary driving point admittances. (Author)

AD-289 355 Div. 8
(TISTE/OHD) OTS price $4.60

General Electric Co., Syracuse, N. Y.
EXPLORATORY STATIC ENERGY CONVERSION STUDY-MULTILAYER THERMIONICS.
Quarterly technical progress rept. no. 1, 1 July-30 Sep 62,
by V. A. Russell, W. Tantraporn, and W. J. van der Grinten. 30 Sep 62, 41p. incl. illus. tables, refs.
(Contract AF 33(657)9204)
Unclassified report

DESCRIPTORS: *Thermoelectricity, *Thermal radiation, *Electric power production, Thermionic emission, Solid state physics, Thin films, High temperature research, Vapor plating, Germanium compounds, Evaporation, Measurement.

A new static heat-to-electricity conversion principle is desscribed which attempts to duplicate in the solid state at a lower temperature the high impedance performance of a vacuum thermionic converter. The basic arrangement is a multilayer structure of thin film semiconductors or insulators perpendicular to the heat flow, separated by thin layers of metals. The optimization of the transverse mean free path of the charge carriers, film thickness, contact potentials and other parameters is discussed. An outline of the exploratory experimental study of this new concept and some practical details on film production and measurements are given. (Author)

AD-289 357 Div. 8, 25
(TISTE/CAM) OTS price $1.60

General Electric Co., Schenectady, N. Y.
SEMICONDUCTOR DEVICE CONCEPTS.
31 Aug 62, 17p. incl. illus. 10 refs. (Scientific rept. no. 1A)
(Contract AF 19(628)329, Proj. 4608)
(AFCRL 62-774(A)) Unclassified report

DESCRIPTORS: *Semiconductors, *Diodes, Liquid metals, Solvent action, Organic solvents, Chemical milling, Diffusion, Chemical impurities, Single crystals, Luminescence, Optics, Radioactive isotopes, Refractory materials, Preparation, Solid state physics, Phosphides, Growth, Zinc compounds, Gallium compounds, Tin compounds, Cadmium compounds, Arsenides, Copper, Silver, Selenides, Sulfides, Tellurides, Gold.

Experiments are described which show that impurities are removed very effectively from crystals of II-VI compounds by heating the crystals in contact with liquid Zn or Cd. Distribution coefficients for Ag and Cu in several of these systems are reported. Light emitting p-n junctions have been prepared from Ga(AsxP1-x) mixed crystals. Edge luminescence in the visible spectrum was observed. Portions of the ternary phase diagrams of the systems (Ga-As-Sn) and 9ga-As-Au) were measured. In the latter system, a deep eutectic minimum was located in the quasibinary GaAs-Au section analogous to the behavior of the Ge-Au and Ge-Si systems. (Author)

AD-289 372 Div. 8, 14, 26
(TISTM/ODN) OTS price $1.60

Chatham Electronics Div., Tung-Sol Electric, Inc., Livingston, N. J.
PRODUCTION ENGINEERING MEASURE FOR POLYOPTIC SEALING OF HYDROGEN THYRATRON TUBES.
Quarterly progress rept. no. 13, 1 July-30 Sep 62, by R. F. Franklin, and John McArtney. 23 Nov 62, 11p.
(Contract DA 36-039-sc-81289)
Unclassified report

DESCRIPTORS: *Thyratrons, *Glass seals, *Miniature electron tubes, Hydrogen, Cleaning, Seals, Tests, Degasification, Abrasives.

An investigation was conducted to find new and better ways of lapping, polishing and cleaning the glassware used in polyoptic tubes. New lap fabricating materials were constructed. The button to bulb lapping technique and a modified glassware cleaning technique were used. (Author)

AD-289 374 Div. 8, 25
(TISTE/OHD) OTS price $1.60

General Electric Co., Syracuse, N. Y.
SEMICONDUCTOR DEVICE CONCEPTS,
31 Aug 62, 13p. incl. illus. (Scientific rept. no. 1B)
(Contract AF 19(628)329, Proj. 4608)
(AFCRL 62-774(B)) Unclassified report

DESCRIPTORS: *Diodes, *Solid state physics, *Oscillation, *Semiconductors, Silicon, Extremely low frequency, Audio frequency, Very low frequency, Radio frequency, Noise (Radio), Cobalt, Chemical impurities, Negative resistance circuits, Magnetic fields, Sandblasting, Gallium compounds, Arsenides, Antimony, Gold alloys, Luminescence, Atomic energy levels, Excitation, Experimental data, Resistance.

Double injection diodes are described which, depending upon the kind of deep level doping impurities empolyed, exhibit instabilities and coherent and/or noisy oscillations in normally positive resistance regions of the v-i characteristics. Similar oscillations in n-type bars of Silicon compensated with certain deep level impurities are also described. The influence of deep levels on these phenomena is discussed. Some preliminary results on experiments with (As sub x P sub 1-x) light emitting junctions are presented. (Author)

AD-289 379 Div. 8, 30
(TISTP/WH) OTS price $8.10

Lincoln Lab., Mass. Inst. of Tech., Lexington.
REVISED RANDWORD CIRCUITRY AND CIRCUIT CHARACTERISTICS,
by W. G. Schmidt. 21 Aug 62, 82p. incl. illus. tables, 2 refs. (Rept. no. 25G-10)
(Contract AF 19(628)500)
(AFESD TDR 62-231) Unclassified report

DESCRIPTORS: *Germanium, *Transistors, *Digital computers, *Alloys, *Electronic switches, Design.

An alloy-junction germanium circuit was developed for medium-speed digital application. The circuits were initially used in a pseudo-random word generator, RANDWORD, and with the exception of the standard flip-flop, will operate up to 750 kcps and +50 C. This report discusses the characteristics of these designs. (Author)

AD-289 380 Div. 8, 25
(TISTP/WH) OTS price $4.60

Lincoln Lab., Mass. Inst. of Tech., Lexington, Mass.
SCATTERING OF ELECTROMAGNETIC WAVES BY AN EATON

LENS,
by J. Rheinstein. 28 June 62, 43p. incl. illus. tables, 20 refs. (Technical rept. no. 273)
(Contract AF 19(604)7400)
(AFESD TDR 62-149) Unclassified report

DESCRIPTORS: *Radar reflectors, *Scattering, *Electromagnetic waves, *Refraction, *Optics, *Lenses.

A discussion is presented of the scattering of electromagnetic waves by an Eaton lens. The results of rigorous calculations of both monostatic and bistatic scattering by an Eaton lens composed of layers of nonlossy dielectric material with a central core are given. These data are then compared with the properties of an ideal Eaton lens with a continuous variation of the dielectric constant as a function of the radius, as derived according to geometrical optics. (Author)

AD-289 431 Div. 8
(TISTP/JW) OTS price $1.10

Kaman Nuclear, Colorado Springs, Colo.
DEVELOPMENT AND FABRICATION OF NON-DESTRUCTIVE SPECIFIC GRAVITY MEASURING EQUIPMENT EMPLOYING RADIATION TECHNIQUE.
Monthly progress rept. for 1-30 June 62.
30 June 62, 2p. (Rept. no. 58-92-PR-46)
(Contract DA 19-029-501-ORD-2631, Proj. TA2-8051)
Unclassified report

DESCRIPTORS: *Servo amplifiers.

AD-289 441 Div. 8
(TISTW/RD) OTS price $7.60

Pacific Semiconductors, Inc., Lawndale, Calif.
PRODUCTION ENGINEERING MEASURE: TRANSISTOR, VHF, SILICON, POWER (5W-70MC).
Quarterly rept. no. 3, 1 Dec 61-28 Feb 62,
by F. Bruder, H. Heller and others. 28 Feb 62, 52p. tables (PSI rept. no. TE 4000:15-Q-3)
(Contract DA 36-039-sc-85960)
Unclassified report

DESCRIPTORS: *Transistors, Silicon, Tests, Electrical properties, Manufacturing methods, Very high frequency.

AD-289 442 Div. 8
(TISTW/RD) OTS price $1.60

Crocker, Burbank and Co. Assn., Fitchburg, Mass.
PRODUCTION ENGINEERING MEASURE ON CAPACITOR PAPER.
Quarterly rept. no. 4, 23 Mar-23 June 62,
by C. E. Cashman. 23 June 62, 12p.
(Contract DA 36-039-sc-85970)
Unclassified report

DESCRIPTORS: *Capacitors, *Paper capacitors, *Paper, Manufacturing methods, Calcium, Hydrogen ion concentration, Chlorides, Determination, Life expectancy, Tests.

AD-289 452 Div. 8
(TISTW/RD) OTS price $1.60

Burndy, Norwalk, Conn.
PRODUCTION ENGINEERING OF TRIAXIAL PULSE CONNECTORS.
Quarterly progress rept. no. 4, 16 Mar-15 June 62,
by F. William Schueler. 15 June 62, 15p.
(Contract DA 36-039-sc-85964)
Unclassified report

DESCRIPTORS: *Electric connectors, Tests, Design, Electrical corona.

AD-289 521 Div. 8, 26
(TISTW/RD) OTS price $5.60

Hi-Q Div., Aerovox Corp., Olean, N. Y.
SUBMINIATURE, MULTILAYER, PRECISION CERAMIC CAPACITORS.
Final rept., 1 June 61-31 Aug 62,
by Robert A. Youngs. 31 Aug 62, 48p. incl. illus.
(Contract DA 36-039-sc-87444, Proj. 3G26-02-031)
Unclassified report

DESCRIPTORS: *Capacitors, *Ceramic capacitors, Thin films, Manufacturing methods, Electrodes, Life expectancy, Electrostatic capacitance, Dielectric films, Ceramic materials, Subminiature electronic equipment.

Experimental work with fine, jet milled ceramic materials and the improvements gained by the use of fine materials is described. Feasibility was established for the fabrication of multilayer, thin film Cerafil capacitors which exhibit an increase in capacitance of about 7.5 times as compared to standard 100 volt rated Cerafil capacitors of similar size. Voltage ratings for the new capacitor types were established by life testing at 30 vdc for temperatures to +85 C. and at 20 vdc to +125 C. (Author)

AD-289 522 Div. 8
(TISTP/WH) OTS price $3.60

Army Electronics Research and Development Lab., Fort Monmouth, N. J.
DESIGN OF STRIP-LINE, LOOP DIRECTIONAL FILTERS,
by Elio Mariani. Mar 62, 30p. incl. illus. tables, 6 refs. (ASRDL Technical rept. no. 2268)
Unclassified report

DESCRIPTORS: *Radiofrequency filters, *Microwaves, *Printed circuits, *Multiplex transmission, *Band-pass filters, Design.

The procedure for the design and construction of both single- and double-loop, narrow-band directional filters is described. The effect of changing various physical dimensions of the loop-resonator with respect to resonant frequency was studied. The relationship between the resonant frequency and the resonator-loop width was empirically determined in the 1600- to 2000-mc frequency range. It is possible to design a filter in this frequency range so that the experimental center frequency is within a few megacycles of the design center frequency; however, this difference can be eliminated by means of tuning. (Author)

AD-289 530 Div. 8, 25
(TISTP/JW) OTS price $2.60

Air Force Cambridge Research Labs., Bedford, Mass.
TRANSMISSION OF THE ATMOSPHERE IN THE INFRARED. A REVIEW,
by J. N. Howard and J. S. Garing. July 62, 24p. incl. illus. tables, refs. (Rept. no. AFCRL 62-814; Air Force Surveys in Geophysics no. 150)
(Proj. 7670)
Unclassified report

DESCRIPTORS: *Infrared transmitters, *Atmospherics, Infrared radiation, Transmission, Bibliography, Adsorption, High altitude.

This survey reviews and summarizes our knowledge of infrared atmospheric transmission and discusses the work that has been done in the past two or three years. Both the theoretical and experimental efforts are covered, with some emphasis on techniques developed to calculate the slant-path transmission. (Author)

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-289 539 Div. 8
(TISTM/ODN) OTS price $3.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
RESEARCH OF CESIUM-VAPOR CELLS EMPLOYING CARBIDE EMITTERS.
Technical summary rept., 1 Feb-31 Oct 62, by F. Carpenter, G. Cheney and others. 31 Oct 62, 36p. incl. illus. tables, 10 refs. (Rept. no. GA-3593)
(Contract Nonr-319300)
Unclassified report

DESCRIPTORS: *Thermionic emission, *Cesium, *Carbides, Vapors, Vacuum systems, Uranium compounds, Zirconium compounds, Surfaces, Adsorption, Chemical analysis, High temperature research, Abrasion, Impurities, Mixtures, Electric currents, Work functions, Electrodes, Vaporization.

Emission poisoning can result when a UC-ZrC emitter is exposed to air after it has been heated to a high temperature. Suitable handling of the emitter after mechanical abrasion of the surface will completely remove the poisoned region and restore satisfactory emission behavior. It was established that thermionic emission from UC-ZrC emitters is largely independent of composition. However, UC-ZrC emitters with low mol-% UC composition are more readily poisoned than those with high mol-% UC compositions. Data on the vacuum thermionic emission of UC-ZrC solid solutions are consistent with the hypothesis that emission from UC and UC-ZrC emitters is controlled primarily by an adsorbed layer of uranium on the surface of the carbide. Work on the Mark I-D thermionic cell has produced a workable and versatile research cell. Initial operation at low temperatures revealed significant information concerning the thermionic effects of cesium on carbide surfaces. Consequently, cesium vapor adsorption causes a substantial modification of the thermionic work function of a carbide. (Author)

AD-289 542 Div. 8
(TISTW/RD) OTS price $9.60

Traveling Wave Tube Product Section, General Electric Co., Palo Alto, Calif.
LOW-NOISE C-BAND TRAVELING-WAVE AMPLIFIER.
Final rept.,
by W. A. Harman. 11 Sep 62, 110p. incl. illus. tables, refs. (Rept. no. TIS R62ELM-215-6)
(Contract AF 39(602)2436, Proj. 4506)
(RADC TDR 62-445) Unclassified report

DESCRIPTORS: *Traveling wave tubes, *Microwave amplifiers, Amplifiers, Noise (Radio), Reduction, Design, Helixes, Electron beams, C band.

Research is presented on the development of an ultralow-noise traveling-wave tube operating in the 5.4- to 5.9-gigacycle band. Data are presented on 29 tubes built and tested during the course of the program. Most of these tubes were test vehicles used to evaluate a number of low-noise gun geometries. Final tubes were constructed with a two-section helix which permitted independent 360-degree phase shift control without any measurable deterioration in noise figure. Of the basic gun geometries tested, the magnetron injection gun exhibited the most promising noise figure data. Using this gun, a room-temperature noise figure of 4.1 db was achieved at 1650 gauss focusing field, which decreased to 3.8 db at a field fo 3500 gauss. With the tube immersed in liquid nitrogen the noise figure dropped to 3.4 db at 1650 gauss, and to 3.1 db at 3500 gauss. The 0.7-db improvement in noise figure that was observed at liquid nitrogen temperatures is in accord with theory. (Author)

AD-289 548 Div. 8
(TISTP/WH) OTS price $4.60

Hewlett-Packard Co., Palo Alto, Calif.
INVESTIGATION OF HOT ELECTRON EMITTER.
Scientific rept. no. 1, 1 June-31 Aug 62. 31 Aug 62, 1v. incl. illus. 5 refs.
(Contract AF 19(628)1637, Proj. 4608)
(AFCRL 62-772) Unclassified report

DESCRIPTORS: *Semiconductors, *Thin films, *Electrons, *Triodes, *Electrical properties, Gold, Silicon.

A theoretical and experimental study has been carried out on the characteristics of semiconductor-metal barriers. Particular emphasis was on details of mechanisms relating to the possibility of utilizing such barriers as emitters of hot electrons or hot holes for high frequency thin film triode applications. (Author)

AD-289 549 Div. 8
(TISTP/GRW) OTS price $4.60

Microwave Associates, Inc., Burlington, Mass.
ULTRA HIGH POWER TRANSMISSION LINE TECHNIQUES.
Technical note no. 2, 19 Dec 61-19 June 62, by Meyer Gilden. 19 June 62, 28p. illus. 6 refs.
(Contract AF 30(602)2545)
(RADC TDR 62-444) Unclassified report

DESCRIPTORS: *Transmission lines, *Waveguides, Microwave frequency, Radiofrequency power, Electric field, High temperature research, Heating, Electric arcs, Integral equations, Failure (Mechanics).

Problems related to failure mechanisms in ultra-high power transmission lines are treated. A more general equation for breakdown is derived for non-uniform conditions using the Boltzmann transport theory and then an approximate solution is discussed for breakdown at a heated surface. Experimental verification including measurements up to pressures of several atmospheres is given for the transition from a localized breakdown at a small hemisphere to a main-volume breakdown. Results of an experimental study of arc movement is given which includes several gases under a variety of conditions. (Author)

AD-289 564 Div. 8
(TISTP/FR) OTS price $3.60

Saskatchewan U. (Canada).
A 600 - CHANNEL MEMORY UNIT FOR IMPROVING SIGNAL-TO-NOISE RATIOS,
by A. L. Broadfoot and D. M. Hunten. May 61, 33p. incl. illus. (Scientific rept. no. CR-5)
(Contract AF 19(604)7265)
(AFCRL-628) Unclassified report

DESCRIPTORS: *Data storage systems, Memory devices, Supersonic delay lines, Pulse generators, Computer logic, Pulse amplifiers, Photomultipliers, Oscilloscopes, Aurorae, Spectrophotometers.

An ultrasonic delay-line memory unit was constructed to add and store successive spectra obtained from a rapid-scanning auroral spectrometer. Information from a photoelectric detector is presented to the memory where it is summed and stored as a serial binary number. The memory is divided into more than 600 ten-digit channels with a capacity of 2 to the 10th

-1 counts per channel. The internal program provides sequential access to channels. An input unit provides continuous summation and temporary storage of random information pulses since the permanent memory can only be entered once every 2.22 milliseconds. A description of the operation of the memory and the functional arrangement of the electronic circuit is given. (Author)

9. FLUID MECHANICS

AD-288 002 Div. 9
(TISTP/WH) OTS price $1.60

Mathematics Research Center, U. of Wisconsin, Madison.
FLOW FORMATION IN COUETTE MOTION OF AN ELASTICO-VISCOUS MAXWELL FLUID IN THE PRESENCE OF A TRANSVERSE MAGNETIC FIELD,
by Subhendu K. Datta. Sep 62, 14p. 2 refs.
(MRC Technical summary rept. no. 340)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Magnetic fields, *Magnetohydrodynamics, *Fluid flow, *Viscosity, *Elasticity, *Transformations (Mathematics).

The flow of an elastico-viscous Maxwell fluid between two parallel plates, the upper one of which is fixed and the lower one moving in its own plane, was studied. It was assumed that a magnetic field perpendicular to the plates is present and the fluid is electrically conducting, elastico-viscous of the Maxwell type and incompressible. Laplace transforms were used to get the velocity field in the fluid and skin friction at the lower plate. We used throughout rationalized M.K.S. system of unit. (Author)

AD-288 024 Div. 9, 25
(TISTP/WH) OTS price $6.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
CATALYTIC SURFACE RECOMBINATION IN BOUNDARY-LAYER PROFILES OF THE FALKNER-SKAN TYPE,
by William J. Rae. Sep 62, 58p. incl. illus. tables, 18 refs. (Rept. no. AF-1412-A-1)
(Contract AF 49(638)782)
(AFOSR-2071) Unclassified report

DESCRIPTORS: *Boundary layer, *Re-entry vehicles, *Recombination reactions, *Catalysts, *Heat of reaction, *Heat transfer, *Hypersonic flow, Integration.

Reactant concentrations in the diffusion-controlled flow over a surface of constant catalycity are calculated for the Falkner-Skan family of profiles. The heat release due to surface recombination is found to be insensitive to the pressure gradient when the wall is relatively noncatalytic; for catalytic walls a decreasing pressure gradient (i.e., more strongly accelerated flow) tends to increase the heat transfer. (Author)

AD-288 086 Div. 9
(TISTA/SEB) OTS price $4.60

David Taylor Model Basin, Washington, D. C.
HEAT TRANSFER AND DRAG RESULTING FROM SEPARATED FLOWS INDUCED BY SURFACE CAVITIES. PART 1. HEAT TRANSFER AT A MACH NUMBER OF 4.5,
by Roger J. Furey. July 62, 36p. incl. illus. 6 refs. (AERO rept. no. 1035)
Unclassified report

DESCRIPTORS: *Metal plates, *Heat transfer, Model tests, Surface properties, Drag, Mathematical analysis, Schlieren photography, Gas flow, Separation, Turbulence, Cavitation, Wind tunnel models, Turbulent flow, Boundary layer, Supersonics.

The results of an investigation conducted at a Mach number of 4.5 to determine the effectiveness of various two-dimensional surface cavities in reducing heat-transfer rates are presented. The heat-transfer rates, which were found to be very sensitive to wall temperature and the shape of the recompression face, were compared with the transfer rates for an attached or flat surface flow under the same free-stream and wall conditions. Two of the four cavity models resulted in lower heat-transfer rates for all test conditions. (Author)

AD-288 098 Div. 9, 25
(TISTP/WH) OTS price $3.60

Republic Aviation Corp., Farmingdale, N. Y.
SPECTROSCOPIC STUDIES OF IMPLODING PLASMA RINGS IN DETONABLE GAS MIXTURES,
by Kenneth M. Foreman and Maurice E. Levy. 30 July 62, 14p. illus. 7 refs. (Rept. no. PPL-TR-62-16; RAC 865)
(Contract AF 49(638)552)
Unclassified report

DESCRIPTORS: *Hypersonic flow, *Electric discharges, *Spectrographic analysis, *Plasma physics, *Electric arcs, *Detonation, Hydrogen, Oxygen.

Spectroscopic observations were made of the flow field behind a cylindrical hypersonic wave front resulting from an imploding electrical discharge into an initially low pressure quiescent gas. Sub-microsecond resolved spectra were obtained by use of a quartz prism monochromator-photomultiplier detector system with photographic recording of an oscilloscope displayed output signal. Electrically produced plasma rings were established in detonable as well as nonreactive gases. Strong indications were observed that exothermic reactions, as evidenced by H2O emission, proceed in H2+1/2O2 reactant mixtures within less than one microsecond under certain initial low pressure conditions. A reaction threshold at 1 mm Hg A. pressure was found for the particular reaction vessel used. Time-integrated spectrometer photos support the conclusions reached with the transient spectra analysis equipment. (Author)

AD-288 100 Div. 9
(TISTA/SEB) OTS price $3.60

Graduate Aeronautical Labs., Calif. Inst. of Tech., Pasadena.
STABILITY OF THE COMPRESSIBLE LAMINAR BOUNDARY LAYER,
by Lester Lees and Eli Reshotko. 1960, 31p. incl. illus. 7 refs.
(Contract DA 04-495-ORD-19)
Unclassified report

Paper to be presented at Boundary Layer Research Meeting, AGARD, NATO, April 25-29, 1960, London, England.

DESCRIPTORS: *Laminar boundary layer, Compressible flow, Supersonics, Hypersonics, Viscosity, Thermal conductivity, Theory, Pressure, Symposia, Mathematical analysis, Stability.

Temperature fluctuations have a profound influence on both the inviscid (slowly-varying) and viscous disturbances above a Mach number of about

2.0. This analysis includes the effect of temperature fluctuations on the viscosity and thermal conductivity, and also introduces the viscous dissipation term that was dropped. Instead of being nearly constant across the boundary layer the amplitude of the inviscid pressure fluctuations decreases markedly with distance outward from the plate surface for Mach numbers greater than 3. This behavior means that the Reynolds shear stress near the critical layer is greatly reduced. At Mach numbers less than 2 dissipation effects are minor, but they become extremely important at higher Mach numbers and tend to become the dominant effect for hypersonic Mach numbers. The rate of conversion of energy from the mean flow to the disturbance flow through the action of viscosity at the wall increases with Mach number. The minimum critical Reynolds number for insulated flat plate boundary layers decreases in the range 0 less than or equal to M less than or equal to 3, and then rises very sharply for hypersonic Mach numbers. (Author)

AD-288 159 Div. 9
(TISTA/GEC) OTS price $6.60

Naval Supersonic Lab., Mass. Inst. of Tech., Cambridge.
PRESSURE DISTRIBUTION ON WARPED WINGS AT SUPERSONIC VELOCITIES,
by Robert L. Peterson. Aug 60, 56p. (Technical rept. no. 389)
(Contract AF 33(616)6475, Proj. 8219)
Unclassified report

DESCRIPTORS: *Wings, *Airfoils, Supersonics, Aerodynamic configurations, Aerodynamic data, Wind tunnel models, Theory, Model tests, Load distribution, Aerodynamics, Pressure.

AD-288 160 Div. 9
(TISTA/GEC) OTS price $5.60

Massachusetts Inst. of Tech., Cambridge.
APPLICATION OF POLYNOMIALS ORTHOGONAL OVER AN INFINITE RANGE TO THE STRIP METHOD OF BOUNDARY LAYER SOLUTION.
Master's thesis,
by Michael G. Buchen. May 62, 44p.
Unclassified report

DESCRIPTORS: *Boundary layer, *Theses, Equations, Velocity, Differential equations, Model tests, Metal plates, Mathematical analysis, Polynomials, Theory.

AD-288 169 Div. 9
(TISTB/SAT) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A ONE-DIMENSIONAL FLOW OF A CONDUCTING GAS WITH A CONSTANT VELOCITY IN A TRAVELLING MAGNETIC FIELD,
by Ye. I. Yantovskiy. 18 May 61, 4p. (Trans. no. FTD-TT-62-331 from Izvestiya Akademii Nauk SSSR, OTH, Mekhaika i Mashinostroyeniye, No. 4, pp. 166-167, 1960)
Unclassified report

DESCRIPTORS: *Gas flow, *Magnetic fields, USSR, Electric currents, Equations of state, Measurement.

AD-288 170 Div. 9
(TISTA/GEC) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
EXTERNAL HEAT AND MASS TRANSFER IN EVAPORATION OF A LIQUID FROM A CAPILLARY-POROUS BODY,
by G. T. Sergeyev. 21 May 62, 8p. (Trans. no. FTD-TT-62-329 from Inzhenerno-Fizicheskiy Zhurnal, Vol. IV, No. 5, pp. 33-37, 1961)
Unclassified report

DESCRIPTORS: *Porous materials, Evaporation, Heat transfer, Adiabatic gas flow, Wind tunnel models, USSR, Turbulent boundary layer, Liquids, Capillary tubes.

AD-288 171 Div. 9
(TISTA/GEC) OTS price $1.60

Foreign Tech Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE TEMPERATURE FIELD OF AIR-COOLED DISCS AND RUNNER BLADES OF GAS TURBINES,
by V. I. Lokay. 21 May 62, 15p. (Trans. no. FTD-TT-62-326 from Izvestiya Vysshykh Uchebnykh Zavedeniy, Seriya 'Aviatsionnaya Tekhnika,' No. 1, pp. 97-104, 1961)
Unclassified report

DESCRIPTORS: *Gas turbine blades, *Gas turbine disks, Air cooled, Mathematical analysis, Thermal conductivity, Heat transfer, Thermodynamics, USSR, Translations, Temperature.

AD-288 175 Div. 9, 1
(TISTA/GEC) OTS price $4.60

Naval Supersonic Lab., Mass. Inst. of Tech., Cambridge.
A PROGRAM OF EXPERIMENTAL AND THEORETICAL RESEARCH ON THE USE OF QUASI-STEADY AIRLOADS IN AEROELASTIC ANALYSIS.
Final rept., pt. 1, phase II,
by Frank H. Durgin and Robert J. Polutchko.
Feb 60, 34p. (Technical rept. no. 423)
Unclassified report

DESCRIPTORS: *Wing-body configurations, *Triangular wings, Flutter, Aerodynamic data, Elasticity, Model tests, Supersonics, Pressure, Deformation, Aerodynamics.

AD-288 290 Div. 9
(TISTA/GEC) OTS price $5.60

Aerospace Corp., El Segundo, Calif.
SHOCK-BOUNDED, SELF-SIMILAR FLOWS WITH VOLUMETRIC MASS, MOMENTUM, AND ENERGY ADDITION,
by Harold Mirels and James F. Mullen. 28 June 62, 46p. incl. illus. tables, 18 refs. (Rept. no. TDR-69(2230-01)TR-2)
(Contract AF 04(695)69)
(DCASTDR 62-135) Unclassified report

DESCRIPTORS: *Gas flow, Shock waves, Turbulent flow, Laminar boundary layer, Perturbation theory, Aerodynamic configurations, Aerodynamics, Theory, Blast, Magnetohydrodynamics, Equations, Motion, Mathematical analysis, Boundary layer control, Moments, Energy, Hypersonic flow.

Self-similar flows with volumetric mass, momentum, and energy addition are investigated. Unsteady flows bounded by shock waves and equivalent steady hypersonic flows over slender bodies are considered, and the form of the shock shape and of the olumetric sources for self-similar motion are noted. For unsteady flows, it is found that the shock shape must have the form R sub 0=ct to the n power (where R sub 0 = shock ordinate, t = time) and that the mass, momentum, and energy sources must be expressible in the form of a function of r/R sub 0 times t to the -1 power, t to the m-2 power, and t to the 2m-3 power, respectively (where r is the lateral ordinate). If the sources

introduce only small perturbations in an otherwise self-similar flow, solutions can be obtained for sources expressible as a function of r/R sub 0 times t to arbitrary constant exponents. Thus, the small perturbation case is less restrictive with regard to the functional form of the sources. For equivalent steady hypersonic flows, the streamwise distance, x, replaces t in the above expressions. Numerical perturbation solutions are obtained for the effect of a uniform transverse magnetic field on piston-driven flows and blast waves. The first-order effect of body-thickness ratio on the hypersonic flow (in the limit of infinite Mach number) over slender power law bodies is also treated. (Author)

AD-288 450 Div. 9
(TISTA/GEC) OTS price $1.10

Aerospace Information Div., Washington, D. C.
THE GEOMETRY AND AERODYNAMIC CHARACTERISTICS OF LIFT-PRODUCING BODIES IN CERTAIN HYPERSONIC FLOWS.
29 June 62, 2p. (AID rept. no. 62-94; Trans. from Keldysh, V. V. Exact solutions for behavior of lift-producing systems with one and two plane shock waves. Inzhenernyy zhurnal, vol. 1, no. 3, pp. 22-39, 1961 (S/258/61/001/003)
Unclassified report

DESCRIPTORS: *Triangular wings, Hypersonics, Wind tunnel models, Model tests, Shock waves, Pressure, Load distribution, Lift, Drag, Aerodynamics.

AD-288 457 Div. 9
(TISTM/TCG) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
SUPERSONIC FLOW PAST AXIALLY SYMMETRIC BLUNT BODIES WITH A DETACHED SHOCK WAVE,
by F. V. Shugayev. 11 May 62, 10p. (Trans. no. FTD-TT-62-351 from Vestnik Moskovskogo Universiteta, No. 2, pp. 46-53, 1961)
Unclassified report

DESCRIPTORS: *Supersonic flow, *Shock waves, *Blunt bodies, Test methods, Mathematical analysis, Theory, USSR.

AD-288 522 Div. 9, 25
(TISTP/TL) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ABOUT HEAT EXCHANGE IN A LAMINAR CURRENT FLOWING IN A TUBE,
by T. L. Perel'man. 15 Oct 62, 7p. incl. table, 11 refs. (Trans. no. FTD-TT 62-1233, from Inzhenerno-Fizicheskii Zhurnal 4:4, pp 43-48, 1961)
Unclassified report

DESCRIPTORS: *Laminar boundary layer, *Fluid flow, *Shock tubes, *Heat transfer, Liquids, Solids, Velocity, Partial differential equations, Integral equations, Bessel functions, Integral transforms, Reynolds number.

An investigation is presented which deals with the joint solution of the equation of heat conductivity for a liquid and a solid (wall of the tube) at the input part of the tube where the heat boundary layer is considerably thinner than the radius of the tube R. In practice, the input area occupies the whole length of the tube. As is known, in the tube there is established a Poiseuille parabolical profile of the velocities u = u sub 0 (1-r squared/R squared), where u sub 0 is the maximum velocity in the center of the tube (r = 0). At the input area instead of r a new variable y = R-r is introduced and is limited by small values (y<<R). (Author)

AD-288 541 Div. 9, 30
(TISTA/GEC) OTS price $3.60

Ohio State U. Research Foundation, Columbus.
INVESTIGATIONS OF CO-AXIAL AIR INJECTION IN A HYPERSONIC WIND TUNNEL.
Report on Aerospace Simulation Techniques Research,
by S. L. Petrie. Aug 62, 28p. incl. illus. refs. (Contract AF 33(616)7451, Proj. 7065)
(ARL-62-394) Unclassified report

DESCRIPTORS: *Hypersonic wind tunnels, Axially symmetric flow, Gas flow, Wing tunnel nozzles, Aerodynamics, Heat transfer, Jet mixing flow, Injectors, Pressure, Theory, Air, Injection.

Investigations were made of the use of co-axial cold air injection around the periphery of the nozzle of a heated hypersonic wind tunnel. Results indicate that sizable reductions in the electrical power required by the heater and reductions in the nozzle heat transfer are possible. Results of experimental studies with a Mach 12 hypersonic wind tunnel having a nozzle exit diameter of 3 in. show that as much as 30% of the tunnel working gas may be supplied by the cold air injection system without severe alterations in the flow properties at the nozzle exit. (Author)

AD-288 579 Div. 9, 14
(TISTM/EJH) OTS price $3.60

Mechanical Technology Inc., Latham, N. Y.
ELASTOHYDRODYNAMIC LUBRICATION.
Interim rept. on the Experimental Phases,
by P. Lewis, S. F. Murray and F. K. Orcutt.
7 Nov 62, 15p. illus. 4 refs. (Rept. no. MTI-62TR29)
(Contract Nonr-372900)
Unclassified report

DESCRIPTORS: *Lubrication, *Sliding contacts, *Roller bearings, Lubricants, Surfaces, Temperature, Films, Thickness, Pressure, Bearings, Test equipment, Mathematical analysis.

Contents:
Rolling disk apparatus
  Description of the rolling disk apparatus
  Measurement techniques
    Surface temperature
    Contact pressure
    Film thickness
Coastdown apparatus
  Description of the coastdown apparatus
  Test program
  Test procedure
Processing of coastdown test data

AD-288 656 Div. 9
(TISTP/WH) OTS price $5.60

Institute of Engineering Research, U. of Calif., Berkeley.
AERO-FORCES ACTING ON A BLUNT BODY WITH SEPARATED FLOW.
Master's thesis,
by Yun-Sing Yuen. 30 Oct 62, 50p. incl. illus. tables, 21 refs. (Rept. no. HE-150-203; Series no. 20, Issue no. 140)
(Contract Nonr-22245)
Unclassified report

DESCRIPTORS: *Supersonic flow, *Blunt bodies, *Aerodynamics, *Axially symmetric flow, *Boundary layer, *Lift, *Drag.

Normal and axial force coefficients were calculated theoretically for a blunt body. Concurrently, aerodynamic forces acting on a model of

the same body type were measured in a supersonic, rarefied gas flow at a Reynolds number of 2260 per inch and nominal Mach number of 4.0, so that the laminar separation was involved in the area bounded by the cylinder and cone. The experimental results, plotted in coefficient form, were compared to the theoretical predictions which consisted of Newtonian hypersonic theory with viscous corrections. The axial force coefficients based on the experimental data were within 3% of the predicted values at low angles of attack (less than 6 degrees). The experimental normal force coefficients were adequately predicted with a similar trend by the theoretical analysis with a maximum error of about 15% over the entire range of both angle of attack and center body position. (Author)

AD-288 657 Div. 9
(TISTP/WH) OTS price $6.60

Institute of Engineering Research, U. of Calif., Berkeley.
DIFFUSIVE SEPARATION OF A GAS MIXTURE APPROACHING A SAMPLING PROBE.
Master's thesis,
by Bruce S. Masson. 30 Oct 62, 57p. incl. illus. 18 refs. (Rept. no. HE-150-206; Series no. 20, Issue no. 141)
(Contract Nonr-22245)
Unclassified report

DESCRIPTORS: *Gas flow, *Mixtures, *Diffusion, *Acceleration, *Supersonic flow, *Density, Instrumentation, Errors, Measurement.

The effect of inserting a probe into a flow field of a flowing gas mixture to obtain localized concentration measurements is considered. The diffusion mechanisms, due to the baro-diffusion and the thermal diffusion effects that cause the concentration variations in the original flow field, cause further changes in the mixture composition during the sampling process. The corrections in the measured composition due to the presence of the probe are calculated for a specific experiment using air as the gas mixture. The corrections are presented as curves for Mach numbers of the approaching stream between 0.1 and 0.4, and Reynolds numbers of the probe between 0.4 and 40. The corrections are based upon the numerical integration of the diffusion equation derived in the Chapman-Enskog Kinetic Theory. The fluid dynamic effects due to the composition change are ignored by using existing pure flow solutions in the flow model. Baro-diffusion is retained as the primary component-separating mechanism in the sampling region. The variation in the composition of the mixture along the stagnation streamline of the approaching flow is found. The total change in composition found here is taken as the correction desired for the probe presence. (Author)

AD-288 676 Div. 9
(TISTP/WH) OTS price $4.60

Aerospace Corp., Los Angeles, Calif.
ON GENERALIZED SOLUTIONS TO THE INVISCID THREE-DIMENSIONAL PERTURBATION EQUATIONS IN A HYPERBOLIC REGION. VOLUME I. THEORETICAL RESULTS,
by C. R. Ortloff. 14 Sep 62, 45p. incl. illus. 13 refs. (Rept. no. TDR-169(3230-11)TN-3, vol. 1)
(Contract AF 04(695)169)
(SSD TDR 62-72) Unclassified report

DESCRIPTORS: *Supersonic flow, *Fluid mechanics, *Superaerodynamics, *Integral transforms, *Matrix algebra, *Partial differential equations, *Series, Turbulent flow.

A method of determining generalized solutions to the three-dimensional small perturbation equations for supersonic flow is derived. By means of integral and matrix transformations, series solutions for the perturbation quantities u, v, w, p, and rho are obtainable at the intersection point of characteristics in a transformed plane. (Author)

AD-288 882 Div. 9, 25
(TISTP/WH) OTS price $2.75

Propulsion Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
ELECTROFLUIDMECHANICS: INVESTIGATION OF THE EFFECTS OF ELECTROSTATIC FIELDS ON HEAT TRANSFER AND BOUNDARY LAYERS.
Final report on Electric Propulsion Technology, by Henry Rene Vellkoff. Sep 62, 128p. incl. illus. tables, refs.
(Proj. 3141)
(ASD TDR 62-650) Unclassified report

DESCRIPTORS: *Electrostatic fields, *Fluid flow, *Fluid mechanics, *Heat transfer, *Boundary layer, *Hydrodynamics, Interferometers, Integral equations, Photographic analysis, Convection, Magnetohydrodynamics.

A series of experiments were conducted on the influence of an electric field on free convection heat transfer. A heated plate was mounted in a Mach-Zehnder interferometer, and the effects of applied electrical fields were studied. Large changes in effective heat transfer were found. Analytical studies were made of this phenomenon. A suitable mathematical model was formulated on the basis of the Von Karman integral equations and the electrostatic field equations. Correlation between the interferometer test data and the mathematical model was achieved. Exploratory tests of fluid orientation and motion under the influence of dielectric forces were also conducted, and the potential usefulness of the phenomenon is graphically portrayed in pictures showing the motion of water droplets in a "Zero-G" model when a field is applied. (Author)

AD-288 886 Div. 9
(TISTA/GEC) OTS price $2.50

Aeroelastic and Structures Research Lab., Mass. Inst. of Tech., Cambridge.
FURTHER STUDIES ON HIGH-SPEED UNSTEADY FLOW.
Final rept., May 61-Mar 62 on Dynamic Problems in Flight Vehicles,
by Garabed Zartarian and Harry Sauerwein. Sep 62, 90p. incl. illus. tables, 20 refs.
(Contract AF 33(616)7883, Proj. 1370)
(ASD TDR 62-463) Unclassified report

DESCRIPTORS: *Hypersonic flow, *Turbulent flow, Aerodynamics, Theory, Load distribution, Pressure, Airfoils, Oscillations, Flutter, Shock waves, Gas flow, Hypersonics, Mathematical analysis, Differential equations, Centrifugal fields, Elasticity, Wing-body configuration, Turbulence.

Investigation was continued of high-speed unsteady flow including an extension of the shock-expansion method and its application to wing and body oscillations at large amplitude; the unsteady Newtonian theory of Hayes and Probstein (Hypersonic Flow Theory, Academic Press, N. Y. and London, 1959), with centrifugal and Coriolis effects; and time-dependent airloads as influenced by rapid changes in the ambient environment. Although the motion of two-dimensional airfoils is emphasized, the difficulties are discussed which arise when one attempts to analyze three-dimensional cases. (Author)

AD-288 902 Div. 9, 25, 30
(TISTP/JW) OTS price $4.60

Engineering Development Lab., Naval Air Development Center, Johnsville, Pa.
DIGITAL TRANSDUCER RESEARCH PROGRAM, 5935-M.
Annual progress rept. no. 2,
by John R. Wullert and Charles L. Bossard.
1 Aug 62, 40p. incl. illus. 1 ref. (Rept. no. NADC-ED-6127)
(WEPTASK R360FR102/2021/R01101001)
Unclassified report

DESCRIPTORS: *Transducers, *Digital systems, Magnetic effects, Voltage, Data processing systems, Signals, Motion, Reliability, Errors.

A seven-bit transducer was designed, fabricated, and evaluated. The results of the evaluation revealed that: the magnetic technique is capable of generating seven binary digits, the armature travel for the seven binary digits is approximately 1.40 inches, and the binary ''zero'' and the binary ''one'' intervals are not uniform. The causes of output signal nonuniformity were investigated. The nonuniformity can be attributed to the misalignment of the matrix rods, the unbalance in the individual sense winding signals at the beginning and end of the matrix, the location of the sense windings on the rods, and the inability to maintain identical sense windings in manual fabrication. Two techniques were established to compensate for matrix output signal nonuniformities. Equations were derived which approximate the output signal from a matrix of series-connected sense windings and from a single sense winding in response to the movement of an armature. (Author)

AD-288 923 Div. 9
(TISTW/RD) OTS price $3.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
MICROWAVE MEASUREMENTS OF PROJECTILE KINEMATICS WITHIN LAUNCHER BARRELS,
by R. E. Hendrix. Nov 62, 29p. incl. illus. table, 6 refs. (Rept. no. AEDC TDR 62-213)
(Contract AF 40(600)1000)
Unclassified report

DESCRIPTORS: *Hypervelocity projectiles, *Hypervelocity guns, *Reflectometers, Velocity, Instrumentation, Microwaves, Waveguides, Motion, Launching.

Microwave reflectometry was applied successfully to the study of the kinematic behavior of projectiles within launcher barrels and pistons within compression (pump) tubes in the Hypervelocity Pilot Range of the von Karman Gas Dynamics Facility. Well-defined mathematical treatment enables the calculation of an accurate time history of projectile position inside its launcher barrel. Microwave excitation in extraneous modes has been attenuated, resulting in an increase in the accuracy of the reflectometer system. (Author)

AD-288 973 Div. 9, 2
(TISTP/JW) OTS price $1.10

Aerospace Information Div., Washington, D. C.
ECCENTRICITY OF THE GEOMAGNETIC FIELD AND THE TRIAXIALITY OF THE EARTH.
12 June 62, 2p. (Trans. from Barta, G. The connection between the eccentricity of the geomagnetic field and the triaxiality of the earth. IN: Academica scientiarum Hungaricae. Acta technica, vol. 37. Series geodaetica et geophysica, vol. 3, no. 1-2, pp. 211-227, 1961)
Unclassified report

DESCRIPTORS: *Magnetic fields, *Gravity, Earth, Geophysics, Velocity.

AD-288 986 Div. 9, 25
(TISTP/JW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE EFFECT OF A MAGNETIC FIELD ON THE FLOW OF A CONDUCTING GAS IN A PLANE TUBE IN THE PRESENCE OF HEAT TRANSFER THROUGH THE WALLS,
by E. P. Zimin. 11 May 62, 6p. (Trans. no. FTD-TT-62-333 from Izvestiya Akademii Nauk SSSR, OTN, Mekhanika i Mashinostroyenie, No. 2, pp. 117-119, 1961)
Unclassified report

DESCRIPTORS: *Magnetic fields, *Fluid flow, Conductors, Gases, Heat transfer.

AD-289 007 Div. 9, 25
(TISTP/WH) OTS price $6.60

RAND Corp., Santa Monica, Calif.
MAGNETO-FLUID-MECHANIC BLAST WAVES IN A MEDIUM WITH FINITE ELECTRICAL CONDUCTIVITY,
by Paul S. Lykoudis. Nov 62, 55p. incl. illus. tables, 5 refs. (Memo. no. RM-3125-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Fluid mechanics, *Blast, *Shock waves, *Magnetohydrodynamics, *Magnetic fields, *Gas flow, *Hypersonic flow, Conductivity.

The classical theory of blast waves is extended for the case of an electrically conducting medium in the presence of a magnetic field. The general case is presented in which waves are generated by the sudden release of energy in a plane (piston problem), line (cylindrical symmetry), or point (spherical symmetry). The medium is assumed to possess electrical conductivity varying with an appropriate power of temperature, whereas the mass-density distribution of the medium in the undisturbed region and the imposed magnetic field are allowed to be power functions of the spatial coordinate. The case of cylindrical symmetry with a constant density in the undistorted fluid region and a constant magnetic field parallel to the cylindrical wave is discussed in detail. It is found that the magnetic field decelerates the fluid behind the shock wave, producing at the same time higher temperatures. (Author)

AD-289 038 Div. 9, 25
(TISTP/JW) OTS price $2.60

California U., Berkeley.
THE FREE ELECTRONS IN ACTIVE NITROGEN.
Report on Research on Aerodynamic Flow Fields,
by W. B. Kunkel and A. L. Gardner. Aug 62, 21p. incl. illus. 23 refs.
(Contract AF 33(616)6161, Proj. 7064)
(ARL 62-404) Unclassified report

DESCRIPTORS: *Ionization, *Fluid flow, Electrons, Density, Nitrogen, Pressure, Oxygen, Ions, Aerodynamics.

The resonance shift in an S-band cavity was used to measure the free-electron density n in a continuous flow of rf excited active nitrogen in the mm Hg pressure range. N varied between 10 to the 7th power and 6 x 10 to the 9th power per cc and depended distinctly on the oxygen contamination. The ions formed presumably are NO+. By admixing known small amounts of nitric oxide to the stream it could be demonstrated that the ionization rate indeed varied linearly with the amount of NO added. At high pressures and large n the electron removal was by recombination and at low pressures and small n it was governed by ambipolar diffusion. The value of Dp/alpha was estimated at 10 to the 9th power mm Hg/cm.

Since the NO must be practically completely dissociated by the active nitrogen, the required large ionization rate indicates that the mechanism probably involves formation of excited nitrogen molecules as an intermediate step. (Author)

AD-289 041 Div. 9
(TISTW/RD) OTS price $1.10

RAND Corp., Santa Monica, Calif.
COMMENTS ON ASME PAPER NO. 62-WA-181: HEAT TRANSFER AND FORCES FOR FREE-MOLECULE FLOW ON A CONCAVE CYLINDRICAL SURFACE,
by R. Schamberg. Nov 62, 9p. incl. illus. 3 refs. (Rept. no. P-2673)
Unclassified report

DESCRIPTORS: *Fluid flow, *Heat transfer, Mathematical analysis, Gas flow, Molecules, Surfaces.

AD-289 204 Div. 9
(TISTP/WH) OTS price $3.60

Rensselaer Polytechnic Inst., Troy, N. Y.
THE FLOW INDUCED BY A NEW TYPE OF SELF-PROPELLED VEHICLE IN A DUCT,
by Peter McGrath, John W. Burr, and William R. Adair. Oct 62, 22p. incl. illus. 5 refs. (Rept. no. TR AE 6204)
(Grant DA-ORD-31-124-61-G88)
(AROD rept. no. 2566:4) Unclassified report

DESCRIPTORS: *Pneumatic systems, *Gas flow, *Propulsion, *Pipes, *Thrust, Ducts, Dynamics, Transonic flow.

An analysis is carried out to determine the magnitude of the flow velocities that are induced inside a tube in the presence of a vehicle which propels itself by the fore-to-aft transfer, at appropriate rates, of the fluid in the adjacent layers within the tube itself. A fixed schedule of accelerations of the vehicle is considered, with various tube end conditions. The greatest induced air velocities are produced if the tube is open at both ends. If the tube is closed at one or both ends, the induced air velocities are more than an order of magnitude lower. In an infinite or half-infinite tube the induced air velocities are greater than those produced in a closed tube, but still an order of magnitude lower than those produced in a tube open at both ends. (Author)

AD-289 232 Div. 9
(TISTP/GRW) OTS price $4.60

AVCO Everett Research Lab., Mass.
THE UNSTEADY HYPERSONIC WAKE BEHIND SPHERES,
by J. A. Fay and A. Goldburg. Nov 62, 40p. incl. illus. tables, 21 refs. (Research rept. no. 139)
(Contracts AF 04(694)33 and DA 19-020-ORD-5476)
Unclassified report

DESCRIPTORS: *Spheres, *Hypersonic flow, *Wake, Blunt bodies, Atmosphere entry, Stability, Wake detectors, Tracer studies, Photographic analysis.

Optical observation of self-luminous wakes behind spheres suggest that vortex loops are generated behind a blunt hypervelocity body and are shed at regular intervals in a manner similar to that which is observed in incompressible flow. Transition phenomena for the hypersonic wake are examined in the light of this vortex shedding hypothesis. A quantitative correlation of transition Reynolds number and Strouhal number is presented for luminous wakes behind spheres in air, argon and xenon at Mach 15 to 25. The values of the Strouhal numbers were obtained by the drum camera technique. The variation of the hypervelocity Strouhal number with Reynolds number shows classical behavior and has an asymptotic limit of about 0.35. In the transition regime, it is suggested that the schlieren photographs show rough eddy-like structure downstream of the body when the large discrete vortex loops break down and decay into the smaller eddies which produce sufficient sharpness of density gradient for schlieren observation. The determination of the appropriate Reynolds number for transition to vortex shedding and to turbulence in wakes behind hypervelocity spheres in pressurized ranges depends strongly on the real gas behavior of the flow. A Reynolds number of 6000 based upon flow conditions at the body shoulder correlates transition data in air for the range of M = 8 to 19, while transition in argon and xenon occurs at 2000. (Author)

AD-289 295 Div. 9, 25
(TISTP/TL) OTS price $5.60

Laboratoire Mediterraneen de Recherches Thermodynamiques (France).
THE USE OF REVOLVING DISCS IN THE STUDY OF INTERACTION PHENOMENA BETWEEN MOLECULES AND A SURFACE.
Final rept.,
by F. Marcel Devienne and G. M. Forestier. Sep 62, 1v. incl. illus. 4 refs.
(Contract AF 61(052)124)
Unclassified report

DESCRIPTORS: *Disks, *Molecules, *Surfaces, *Gas flow, *Superaerodynamics, *Molecular beams, Reflection, Scattering, Velocity, Series, Xenon, Helium, Argon, Nitrogen, Carbon dioxide, Ionization gages, Air, Vacuum systems, Thermodynamics.

The purpose was to complete researches performed by means of the revolving arm. Two discs were built 800 mm. and 1,250 mm. in diameter. These discs can be run up to a maximum peripheral speed in the range of 350 m/s for the smaller and 600 m/s for the larger. These discs are placed in two tanks being respectively 1.50 and 2 meters in inner diameter. The purpose of the first researches was the study of the dispersion of molecules reflected by a moving surface. For this study a very thin molecular beam was sent normally to the edge of the disc, and the measurement of the pressure variations in two gages symetrically placed with respect to the molecular beam and at a varying angle to the surface of the disc was taken. Two series of experiments were made. Some results have shown that the dispersion of molecules reflected by a moving surface is very different from the dispersion when the same surface is at rest. The higher the speed, the greater the difference; on the other hand, the dispersion depends on the nature of the gas. In this manner, this dispersion is much larger for Xenon than for Helium and Argon. (Author)

AD-289 411 Div. 9, 25
(TISTP/JW) OTS price $1.60

Iowa Inst. of Hydraulic Research, Iowa City.
IMAGE SYSTEM IN AN ELLIPSE DUE TO AN EXTERNAL SOURCE,
by Matilde Macagno. July 62, 14p.
(Contract Nonr-161101)
Unclassified report

DESCRIPTORS: *Image intensifiers (Electronics), *Hydrodynamics, Ellipsoids, Fluid flow, Special functions.

AD-289 437 Div. 9, 25
(TISTP/JW) OTS price $8.60

Massachusetts Inst. of Tech., Cambridge.
THRUST OF A SMALL ORIFICE AT LOW REYNOLDS NUMBERS.
Master's thesis,
by George Richard Offen. June 62, 83p.
Unclassified report

DESCRIPTORS: *Thrust, *Reynolds number, *Turbines, Theses, Design.

AD-289 443 Div. 9, 25
(TISTP/JW) OTS price $1.60

Wisconsin U., Madison.
DIRECT PRODUCT REPRESENTATION OF WAVE FUNCTIONS,
by Ernest R. Davidson and Leon L. Jones.
7 June 62, 11p. (Rept. no. CF-2986, Series 3)
(Contract NOrd-15884)
Unclassified report

DESCRIPTORS: *Wave analysis, *Functions, Matrix algebra, Particles, Density, Operators (Mathematics).

AD-289 451 Div. 9, 25
(TISTP/JW) OTS price $4.60

Massachusetts Inst. of Tech., Cambridge.
LEGENDRE POLYNOMIALS APPLIED TO THE STRIP METHOD FOR SOLVING THE COMPRESSIBLE BOUNDARY LAYER EQUATIONS WITH ELECTRICAL EFFECTS.
Master's thesis,
by John K. Davidson. June 62, 37p.
Unclassified report

DESCRIPTORS: *Compressible flow, *Boundary layer, Polynomials, Electrical effects.

AD-289 501 Div. 9, 15
(TISTP/WH) OTS price $6.60

Brigham Young U., Provo, Utah.
TAYLOR EXPANSIONS OF THE HYDRODYNAMIC EQUATIONS. PART I.
by Keith L. McDonald. Nov 60, 67p. incl. illus. tables, 3 refs.
Unclassified report

DESCRIPTORS: *Fluid mechanics, *Taylor's series, *Hydrodynamics, *Differential equations, *Continuum mechanics.

The Taylor expansions of the two important differential equations of fluid dynamics, namely, the classical momentum equation and the equation of continuity are treated. Two different methods of investigation are employed. In the first, the relationship between the pressure, mass density, and fluid velocity, each represented by their Taylor expansions, are obtained by equating to zero the coefficients of like terms in the rectangular coordinates in these equations. In the second method, only the velocity is expanded, in vector modes, and the pressure and density are resolved subject to standard auxiliary relationships. This procedure enables one to view the iso-pressure surfaces in the neighborhoods of singular points for various types of asymptotic velocity fields. (Author)

AD-289 524 Div. 9, 12
(TISTA/GEC) OTS price $3.60

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
A THREE-DIMENSIONAL LIFTING REENTRY VEHICLE SIMULATION,
by Norbert D. LaVally. Aug 62, 19p. illus. 5 refs.
Unclassified report

DESCRIPTORS: *Re-entry vehicles, Lift, Aerodynamics, Mathematical analysis, Satellite vehicles, Equations, Motion, Analog computers, Mathematical prediction, Satellite vehicle trajectories, Integral equations, Simulation.

The three-dimensional equations of motion, written in a flight path coordinate system, are presented for a re-entering orbital vehicle. An analog computer circuit used for the solution of these equations is described. Typical computer solutions are presented and discussed. (Author)

AD-289 561 Div. 9, 1
(TISTA/GEC) OTS price $8.60

Princeton U., N. J.
A PRELIMINARY STUDY OF THE DYNAMIC STABILITY AND CONTROL RESPONSE DESIRED FOR V/STOL AIRCRAFT,
by D. R. Ellis and G. A. Carter. June 62, 78p. incl. illus. 9 refs. (Rept. no. 611)
(Contract DA 44-177-tc-838)
Unclassified report

DESCRIPTORS: *Vertical take-off planes, *Short take-off planes, Helicopters, Stability, Automatic, Stabilization systems, Automatic pilots, Feed back, Simulation, Flight paths, Acceleration, Velocity, Stability (Longitudinal), Mathematical analysis, Equations, Motion, Flight simulators, Gusts, Control systems.

A study was made to determine the nature of the longitudinal dynamics which become available when an aircraft is stabilized automatically and the pilot's controls are linked electrically to the autopilot, resulting in a ''fly-by-wire'' control system. Analytical studies, using root locus and frequency analysis techniques, are verified and extended by fixed-base flight simulator experiments. A tandem-rotor helicopter is treated as an example, and major emphasis is placed on hovering flight. Piloting tasks which demand that the aircraft be stable and have good control response characteristics are used. Pitch attitude and attitude rate feedbacks are found to be necessary if the machine is to be stabilized sufficiently to allow the pilot to control it in hovering flight by reference to displacement information only. The addition of acceleration and ground speed feedbacks results in improved velocity response and better system performance as measured by the pilot's ability to precisely perform the hovering task. The effectiveness of any given combination of feedback gains may be predicted by examining both the position of the aircraft characteristic roots on the complex plane and the closed-loop performance of the pilot-machine system. (Author)

AD-289 562 Div. 9, 25
(TISTP/JW) OTS price $9.60

RCA Defense Electronic Products, Camden, N. J.
A FREQUENCY SYNTHESIZER STUDY FOR THE PROPOSED AN/GRC-103.
Final rept. on Task IIC,
by J. Klapper and B. Rabinovici. 15 July 62, 107p. incl. illus. tables, 19 refs. (Rept. no. CR-62-419-8)
(Contract DA 36-039-sc-87240)
Unclassified report

DESCRIPTORS: *Microwave spectroscopy, *Relay transmitters, *Solid state physics, Crystals, Filter papers, Switching circuits, Stability, Signals, Voltage, Oscillators.

Task IIC entailed a study of frequency synthesis for the AN/GRC-103 radio. The study was based on: (1) providing 700 manually switched channels to the modulator, equally spaced at 25 kc intervals; (2) modulator output frequency

range to be 87.625-175 mc; (3) frequency stability to be 0.02% or better; (4) spuria outside the channel to be 80 db below desired signal; and (5) synthesizer to consist solely of solid-state components. Method of design is based on application of pure sinusoidal signals to each mixer. This requires proper interstage filtering and buffering. Initial levels are typical and may need readjustment at final design stage. Proper shielding, layout, and packaging, though not treated here, are basic requirements.

10. FUELS AND COMBUSTION

AD-287 987 Div. 10
(TISTM/EJH) OTS price $12.00

Princeton U., N. J.
NONLINEAR ASPECTS OF COMBUSTION INSTABILITY IN LIQUID PROPELLANT ROCKET MOTORS.
Final yearly progress rept. no. 2, 1 June 61-31 May 62,
by David T. Harrje, W. C. Strahle, and W. A. Sirignano. 1 June 62, 162p. incl. illus. 33 refs.
(Aeronautical engineering rept. no. 553b)
(Contract NOw 61-0686-d)
Unclassified report

DESCRIPTORS: *Rocket motors, *Liquid rocket propellants, *Combustion, Stability, Fuel injection, Sprays, Drops, Vaporization, Detonation, Shock waves, Rocket motor nozzles, Exhaust nozzles, Heat transfer, Fuel injectors, Perturbation theory, Nonlinear systems, Mathematical analysis.

Contents:
Injection orientation
Sector motor (Variable-angle)
Sector motor (Variable-length)
Pulsed limits tests
Effect of the approximation to the velocity distribution in instability calculations
Determination of characteristics velocity with cooled exhaust nozzle
Basic pulse studies
Nonlinear transverse combustion instability
Some effects of injection droplet variation and vaporization rate perturbations on combustion instability
Significance of the Quasi-Steady-State Assumption in droplet vaporization theory

AD-288 031 Div. 10, 25
(TISTM/ODN) OTS price $1.60

General Electric Co., Cincinnati, Ohio.
RESEARCH ON THE FEASIBILITY OF VAPORIZING FUELS FOR INCREASED HEAT CAPACITY.
Quarterly progress rept. no. 4 for period ending 1 Aug 62,
by G. G. Kutzko. 1 Aug 62, 12p. incl. illus. tables. (Rept. no. DM 62-221)
(Contract AF 33(616)8224)
Unclassified report

DESCRIPTORS: *Fuels, *Vapors, Specific heat, Feasibility studies, Hydrocarbons, Heat transfer, Calorimeters, Costs.

Construction of a modified calorimeter rig was completed. Selection of hydrocarbons to be tested was made, based on the previous results. Experimental work on the program thus far is limited.

AD-288 077 Div. 10, 12, 26
(TISTM/RGR) OTS price $2.00

Atlantic Research Corp., Alexandria, Va.
A PROGRAM TO ADVANCE THE TECHNOLOGY OF FIRE EXTINGUISHMENT.
Interim rept., Apr 61-Mar 62,
by M. Markels, Jr., R. Friedman and others.
Sep 62, 65p. incl. illus. tables, 27 refs.
(Contract AF 33(616)8110, Proj. 6075)
(ASD TDR 62-526) Unclassified report

DESCRIPTORS: *Fire extinguishers, *Hydrogen, *Explosions, Fires, Detonation, Oxygen, Gases, Foams, Potassium compounds, Bicarbonates, Additives, Catalysis, Combustion, Chlorocarbons, Liquefied gases.

Burning rates of liquid H were determined and extinguishing agents were evaluated for dewar and spill fires and the detonation suppression of gaseous H-O mixtures was studied. A combination of mechanical foam containing N2 followed by potassium bicarbonate powder was the most effective method for extinguishing spill and dewar fires. A foam rate of 0.35 gal of contained water/(min x sq ft) of fire surface, followed by potassium bicarbonate at a rate of 0.7 lb/(sec x sq ft) of fire surface, was effective for spill fires. Although foam alone did not extinguish either type of liquid H fire, it reduced the burning rate and thus the intensity of the fire. To extinguish a dewar fire, it was necessary to apply potassium bicarbonate at a rate of 3 lb/(sec x sq ft). Spill fires were not extinguished with this dry agent alone. Carbon dioxide was effective on dewar fires at an application rate of about 1.0 lb/(sec x sq ft). Application rate rather than total quantity of agent was the important variable for extinguishment. Ten additives were evaluated to determine their effect on detonation initiation energy required for gaseous H-O mixtures. Carbon tetrachloride sensitized detonation. Methane and methyl chloride showed an appreciable inhibiting effect, and iron pentacarbonyl was the best detonation suppressant tested. (Author)

AD-288 266 Div. 10
(TISTM/EJH) OTS price $2.60

Aeronutronic, Newport Beach, Calif.
STUDY OF DETONATION BEHAVIOR OF SOLID PROPELLANTS.
Quarterly rept. no. 3,
by M. H. Boyer, R. A. Grandey and others.
20 Oct 62, 27p. incl. illus. 7 refs. (Pub no. U-1900)
(Contract NOw 62-0503-c)
Unclassified report

DESCRIPTORS: *Solid rocket propellants, *Detonation, Shock waves, Detonation waves, Polymers, Urethanes, Equations of state, Programming, Mathematical analysis, Theory.

Development of a theoretical treatment of detonation behavior by numerical integration is reported. One minor refinement was made in the mathematical procedures. This was primarily in the interest of completeness, rather than any anticipated significant effect on the results of the integration. An important development was the discovery that the use of the von Neuman ''q'' in integrating through a reactive shock can, under some circumstances, falsify the entropy increase and, as a consequence, seriously affect the computed final steady state propagation velocity. The two dimensional program is now in the final checkout and debugging stage. It is being actively pressed and should be completed soon. This will be affected somewhat

by the problem associated with the von Neuman "q" described above. The equation of state work is progressing at an accelerated pace. Data are presented in this report on polyurethane. (Author)

AD-288 595 Div. 10
(TISTP/TL) OTS price $1.10

New York U., N. Y.
A FUNDAMENTAL STUDY OF THE HYDRODYNAMIC EQUATIONS FOR FREE-RADICAL FLAMES.
Final technical rept., Jan 57-Oct 62, by Edwin S. Campbell. Oct 62, 5p. 11 refs. (Contract AF 49(638)169)
Unclassified report

DESCRIPTORS: *Flames, *Combustion, *Ozone, *Oxygen compounds, *Thermodynamics, *Hydrodynamics, Physical properties, Taylor's series, Numerical analysis, Integration, Differential equations, Free radicals, Equations.

An investigation of the ozone-oxygen flame is presented. This will be another link in the study of how flame properties - thickness, speed, heat release, specific enthalpy, mol-fraction and fractional mass-flow profiles - are affected by the kinetic scheme and will offer another test of the importance of assumptions introduced in more approximate flame theories. This system is particularly advantageous for two reasons: (1) it has possibly the simplest kinetics of any real flame; and (2) it has been studied experimentally over a wider range of the relative importance of the different elementary reactions by the simple expedient of varying the input (03/02) ratio. (Author)

AD-288 723 Div. 10
(TISTM/TCG) OTS price $3.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE THEORY OF COMBUSTION OF GAS MIXTURE FLOW AND THE CRITICAL CHARACTERISTICS OF ITS IGNITION, by L. N. Khitrin. 19 June 62, 30p. (Trans. no. MCL-1331 from Teoriya i Praktika Szhiganiya Gaza, Gostoptekhizdat, Leningrad, pp. 94-115, 1958)
Unclassified report

DESCRIPTORS: *Gases, *Gas flow, *Ignition, Theory, Flame propagation, Reaction kinetics, Stabilization, Diffusion, USSR, Combustion.

AD-288 752 Div. 10, 4
(TISTM/TCG) OTS price $1.10

Aerospace Information Div., Washington, D. C.
HEAT STABILITY OF PROPELLANTS: HYDRAZINE PERCHLORATE.
27 June 62, 2p. (AID rept. no. 62-90; Trans. from Shidlovskiy, A. A., V. I. Semishin, and L. F. Shmagin. Thermal decomposition and combustion of hydrizine perchlorate. Zhurnal prikladnoy khimii, vol. 35, no. 4, pp. 756-759, 1962 (S/080/62/035/004))
Unclassified report

DESCRIPTORS: *Solid rocket propellants, *Combustion, *Decomposition, *Hydrazines, Perchlorates, Catalysts, Manganese compounds, Cobalt compounds, Oxides, Stability.

AD-288 771 Div. 10, 4
(TISTM/TCG) OTS price $1.10

Ohio State U. Research Foundation, Columbus.
THE MECHANISM OF OXIDE FORMATION IN THE INITIAL STAGES OF OXIDATION.
Quarterly rept., 1 Apr-30 June 62, by D. W. Rausch, K. L. Moazed and M. G. Fontana. 26 July 62, 3p. (RF proj. no. 1126; Rept. no. 8) (Contract DA 33-019-ORD-3387, Proj. 2734-C)
Unclassified report

DESCRIPTORS: *Oxygen, *Combustion, *Oxidation, *High temperature research, Vacuum systems, Test methods, Tungsten, Theory.

AD-288 815 Div. 10, 4
(TISTM/TCG) OTS price $5.60

National Cash Register Co., Dayton, Ohio.
A STUDY OF THE ENCAPSULATION APPLICABLE TO LIQUID ROCKET FUEL.
Interim rept. no. 4, 1 July 61-30 June 62, by Paul Y. Hsieh. July 62, 55p. incl. illus. tables, 4 refs.
(Contract Nonr-284800)
Unclassified report

DESCRIPTORS: *Liquid rocket propellants, *Polymers, *Rocket oxidizers, *Polymerization, Colloids, Reaction kinetics, Ethyl cellulose, Hydrazines, Amides, Halogens, Solvent action, Deterioration, Storage, Fuel thickeners, Surface properties, Films, Membranes, Physical properties, Wetting agents, Nickel plating, Free radicals, Synthesis, Encapsulation, Moisture proofing, Photochemical reaction.

This report covers the study of polymers for use in the encapsulation of energetic liquids, such as N_2H_4, which react readily with moisture and other propellant ingredients. Several new polyamides were synthesized by interfacial polymerization; none showed moisture resistance comparable to certain commercial polymers. Photopolymerization rate studies employing desylaryl sulfides initiators were conducted to improve moisture resistance through cross-linking. N_2H_4 compatibility with 24 commercial polymers was determined; 10 of these exhibited no change after being soaked in N_2H_4 for 78 days. The halogen-containing polymers, which were the most moisture-resistant, were attacked by N_2H_4. Encapsulation phenomena studies included interfacial energy in encapsulation processes, dispersion stability, and gelling of hydrazine. Sorbitan monooleate was an instant gelling agent.

AD-289 003 Div. 10, 17
(TISTM/ODN) OTS price $1.60

Phillips Petroleum Co., Bartlesville, Okla.
GAS TURBINE AND JET ENGINE FUELS.
Bimonthly progress rept. no. 3, by William L. Streets. 1 Nov 62, 7p. incl. illus. tables, 5 refs. (Research Div. rept. no. 3329-62R)
(Contract N600(19)58219)
Unclassified report

DESCRIPTORS: *Jet engine fuels, Sulfur, Gas turbines, High temperature research, Alloys, Chemical impurities, Combustion chamber gases, Combustion, Nickel alloys, Cobalt alloys, Chromium alloys, Tungsten alloys.

Study of the effects of S in jet fuels on the durability of engine hot section components was continued. The previously reported 2000 F 6 hr turbine guide vane metal loss tests were extended to a total duration of 12 hrs. Twelve-hour tests are now complete on Waspalloy, Udimet 500, Haynes Alloy 25, Rene 41 and Hastelloy R-235 using the

S-free base fuel. Data are not yet available with the S contaminated fuel but will be forthcoming. The results of these 2-in combustor tests indicate that guide vane metal loss is approximately a linear function of test time for these alloys operating with this isoparaffinic JP-5 type S-free fuel for a 12-hr duration. No marked acceleration of metal loss rate was observed between 6 and 12 hours. The extension of test duration did not alter the relative rankings of the alloys appreciably. Haynes Alloy 25 remained lowest in metal loss and Hastelloy R-235 highest. Waspalloy and Rene 41 approached the same metal loss at 12 hours. Udimet 500 exhibited metal losses somewhat below Waspalloy and Rene 41 but still roughly intermediate between the Hastelloy R-235 and Haynes Alloy 25 extremes. (Author)

AD-289 035 Div. 10
(TISTM/EJH) OTS price $1.00

Atlantic Research Corp., Alexandria, Va.
A STUDY OF EXPLOSIONS INDUCED BY CONTACT OF HYDRAZINE-TYPE FUELS WITH NITROGEN TETROXIDE.
Final rept., 1 June 61-31 May 62 on a Study of Extinguishment and Control of Fires Involving Hydrazine-Type Fuels with Air and Nitrogen Tetroxide,
by Raymond Friedman, William P. Barnes, Jr., and Michael Markels, Jr. Sep 62, 31p. incl. illus. table, 8 refs. (Rept. no. ARC 62-5038.05-F)
(Contract AF 33(616)6918, Proj. 6075)
(ASD TDR 62-685) Unclassified report

DESCRIPTORS: *Liquid rocket propellants, *Rocket oxidizers, *Explosions, Nitrogen compounds, Tetroxides, Hydrazines, Methyl hydrazines, Fuels, Mixtures, Combustion, Hazards, Test methods.

The mechanism of explosions which may result when a hydrazine-type liquid is brought into contact with liquid nitrogen tetroxide was studied. Falling-droplet experiments showed correlation between distance of fall and probability of explosion. Sudden injection of one liquid into the other, with high-speed photography, gave nonreproducible results. Occasional explosions occurred, preceded by bubble formation. Alternate theories of the explosion phenomenon are discussed. (Author)

11. GROUND TRANSPORTATION EQUIPMENT

AD-287 944 Div. 11
(TISTB/LH) OTS price $3.60

Human Engineering Labs., Aberdeen Proving Ground, Md.
REVIEW OF HUMAN FACTORS STUDIES OF M-113 AND A NEW CONCEPT ARMORED SQUAD CARRIER,
by Bernard M. Corona, Aug 62, 36p. incl. illus. (Technical note no. 4-62)
Unclassified report

DESCRIPTORS: *Human engineering, *Armored vehicles, Military requirements, Military transportation, Design.

This report summarizes some of the basic human factor problems existing in the M-113 APC, and describes a human factor design approach for a new Armored Squad Carrier Concept. In addition, a new concept mock-up, based on some of the design parameters listed, was built and is described. The new concept emphasizes areas of crew efficiency and stowage of equipment. (Author)

AD-288 196 Div. 11
(TISTB/SAT) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE BRAIN, THE HEART, AND THE HANDS OF THE SPACESHIP,
by T. Mashkevich, 9 May 62, 8p. (Trans. no. FTD-TT-62-725 from Ekonomicheskaya Gazeta, No. 13, vol. 34, pp. 30, 26 Mar 62)
Unclassified report

DESCRIPTORS: *Spaceships, *Space capsules, Astronautics, Space navigation, USSR.

AD-288 702 Div. 11
(TISTM/ODN) OTS price $2.60

Army Transportation Research Command, Fort Eustis, Va.
OPERATIONAL PROBABILITY OF TRUCK PERFORMANCE EQUATION (SNOW).
Research rept.,
by John H. Neblett. Jan 62, 23p. (TCREC Technical rept. no. 61-14)
(Proj. no. 9R99-01-004-02)
Unclassified report

DESCRIPTORS: *Cargo vehicles, *Tests, *Snow, *Equations, Theory, Statistical analysis, Experimental data, Probability.

AD-289 068 Div. 11, 1
(TISTB/LMH) OTS price $1.50

Federal Aviation Agency, Atlantic City, N. J.
EVALUATION OF SNOW, ICE, AND SLUSH REMOVAL AND DISPOSAL EQUIPMENT FOR WASHINGTON INTERNATIONAL AIRPORT.
Final rept.,
by John Aleo. July 62, 1v. incl. illus. tables.
(Proj. 445-2-2V)
Unclassified report

DESCRIPTORS: *Snow removal, Snow, Ice, Disposal, Maintenance equipment, Operation, Airports.

The only devices which appeared capable of coping with the problem of snow, ice, and slush removal and disposal were equipments employing the jet-engine technique. This equipment, using the tailpipe blast and heat of a jet engine, was claimed to be capable of melting and vaporizing snow. Thus, the equipment was selected for evaluation because the jet-engine technique represented the ultimate solution for the problem. General data have been published concerning the performance of this equipment. The actual heat energy output by the equipment required to remove or melt a particular amount of snow is unknown. A representative fuel combustion rate for the type of jet engine used by these equipments is 600 gallons per hour at 90% throttle setting. However, there was insufficient operational experience to establish an efficiency estimate for the type of equipment. (Author)

AD-289 440 Div. 11, 7
(TISTW/RD) OTS price $1.10

Army Test and Evaluation Command, Aberdeen Proving Ground, Md.
SERVICE TEST OF KIT, ALTERNATOR, 100 AMPERE, FOR TRUCK, UTILITY, 1/4 TON, 4 x 4, M 151.
13 Aug 62, 5p.
(Proj. no. 2198)
Unclassified report

DESCRIPTORS: *Generators, *Cargo vehicles, Tests, Electrical equipment, Alternating current.

12. GUIDED MISSILES

AD-287 913 Div. 12
(TISTA/SEB) OTS price $1.10

RCA Labs. Div., Radio Corp. of America, Princeton, N. J.
SYSTEM ORGANIZATION FOR GENERAL COMMUNICATION VIA MEDIUM-ALTITUDE SATELLITES,
by D. G. C. Luck. Sep 62, 5p. incl. illus.
Unclassified report

DESCRIPTORS: *Satellite vehicles, *Telephone communication systems, Urban areas, Radio relay stations, Orbital flight paths, Satellite vehicle trajectories, Communications systems, Design.

Probable early application of satellites to provide trunk-line interconnection between pairs of very heavy-traffic communication centers, in cases where other communication links are not readily usable, has led to considerable system study directed toward this special application. System aspects of the probable later use of satellites to render communication service flexibly to many users of moderate size all over the world have received less detailed study to date. Applicability of various concepts of system organization to the more general problem merits continuing investigation. A set of concepts is given that lead to system operating characteristics suitable for general-utility communication. Under self-imposed limitations of medium satellite altitude and avoidance of direct satellite-to-satellite communication, it applies these concepts to generate examples of potentially useful systems. (Author)

AD-287 957 Div. 12, 9
(TISTA/SEB) OTS price $2.25

Booster and Power Div., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
PROCEDURES FOR THE DESIGN OF THERMAL PROTECTION SYSTEMS FOR MANEUVERABLE RE-ENTRY VEHICLES.
Master's thesis,
by Donald Turrentine. Sep 62, 73p. incl. illus. tables, 17 refs.
(ASD TDR 62-625) Unclassified report

DESCRIPTORS: *Hypervelocity vehicles, *Aerodynamic heating, Gliders, Satellite vehicles, Airframes, Temperature control, Maneuverability, Radiators, Thermal radiation, Cooling, Temperature, Controlled atmospheres, Spaceship cabins, Mathematical analysis, Thermal conductivity, Computers, Differential equations, Digital computers, Least squares method, Theory, Re-entry vehicles, Thermal insulation, Heat transfer.

Atmospheric re-entry of earth-orbital, hypersonic glide vehicles creates thermal problems. The heat affects not only the materials and construction of the airframe but also the crew and various subsystems of the vehicle. Successful solution of these problems depends upon the development of an effective thermal protective concept, which will also give the designer some latitude in his design philosophy. The role of the protective system is to significantly attenuate the influx of heat that is aerodynamically generated within the surrounding boundary layer. Attenuation is accomplished by combining external radiation shielding elements with backup insulation materials and an appropriate cooling system. Analytical procedures are presented for determining significant system parameters by transforming the differential heat conduction or diffusion equation into an algebraic expression by employing the calculus of finite differences. The adaptation of the resulting equation to digital computer programming is discussed, and numerical results are presented to indicate systems of minimum weight. (Author)

AD-288 158 Div. 12
(TISTA/GEC) OTS price $1.10

Aerospace Information Div., Washington, D. C.
SATELLITE OBSERVATORY.
24 July 62, 4p. (AID rept. no. 62-107; Trans. from Dobrichovsky, Z. Astronomical observatory in space. Veda technika mladezi, no. 9, pp. 305-307, 1962)
Unclassified report

DESCRIPTORS: *Satellite vehicles, *Extraterrestrial bases, Configuration, Staging, Design, USSR, Astronomical observatories.

AD-288 255 Div. 12, 16
(TISTA/SEB) OTS price $1.60

Naval Research Lab., Washington, D. C.
ANALYSIS OF THE SPACECRAFT ATMOSPHERE,
by R. A. Saunders. 23 Oct 62, 17p. incl. illus. 3 refs. (NRL rept. no. 5816)
Unclassified report

DESCRIPTORS: *Closed-cycle ecological systems, *Spaceship cabins, *Controlled atmosphere, Contamination, Satellite vehicles, Manned, Gases, Chromatographic analysis, Infrared spectroscopy, Pilots, Hazards, Effectiveness, Space capsules.

A study was made of the nature of the contaminants introduced into the cabin atmosphere of a Project Mercury space capsule, external to the pressure suit, by the deliberately induced malfunction and overheating of certain parts of the capsule equipment during simulated flight. The contaminants were collected and concentrated by an adsorption-desorption cycle employing activated charcoal as the adsorbing medium. An analytical gas chromatograph was used to resolve the components of the contaminant mixture, which were then recovered individually from the effluent stream of the chromatograph and identified by means of their infrared spectra. Thirty-five components were detected in this atmosphere, 26 of which were identified. Approximate minimun concentrations were indicated for the latter. The contaminant mixture comprised aliphatic and aromatic hydrocarbons, chlorinated hydrocarbons, and aliphatic alcohols, esters, and ketones. Some of the contaminants were present in sufficient concentration that they could possibly reduce the effectiveness or efficiency of an exposed pilot. (Author)

AD-288 264 Div. 12
(TISTW/RD) OTS price $1.60

International Aeronautical Congress, Berne (Switzerland).
ON THE INFLUENCE OF THE IONOSPHERE ON THE RADIO-TRACKING OF SPACE ROCKETS,
by G. L. Gdalevich, K. I. Gringauz and others. 1962, 13p. 25 refs.
Unclassified report

Paper presented at XIII International Astronautical Congress, 23-29 September 1962, Varna, Bulgaria.

DESCRIPTORS: *Satellite vehicles, *Radar tracking, *Radio interception, *Radar interception, Errors, Electrons, Density, Radio signals, Interception, Tracking, Ionosphere, Extraterrestrial radio waves.

The report contains some considerations relating to the possibility of calculating the errors caused by the ionosphere at the radiotracking, i.e. during the determination of space vehicle co-ordinates and velocities by radiomethods. Expressions are given for these errors depending on the ionosphere parameters. The possibility is discussed of the approximation of the actual altitude electron density distributions for the estimation of the errors under consideration. (Author)

AD-288 403 Div. 12
(TISTB/SAT) OTS price $3.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
SCIENCE AND LIFE (SELECTED ARTICLES).
24 Apr 62, 30p. (Trans. no. FTD-TT-62-200 from Nauka I Zhizn, No. 4, pp. 8-11, 37-41, Apr 61)
Unclassified report

DESCRIPTORS: *Space flight, Satellite vehicles, Solar energy, USSR, Solar systems.

AD-288 521 Div. 12
(TISTA/SEB) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ACADEMY OF SCIENCES USSR, ARTIFICIAL EARTH SATELLITES (SELECTED ARTICLES),
18 Oct 62, 17p. incl. illus., 6 refs.
(Trans. no. FTD-TT-62-694, from Akademiya Nauk SSSR, Iskusstvennyye Sputniki Zemli, No. 8, pp. 64-71, 90-93, 1961).
Unclassified report

DESCRIPTORS: *Satellite vehicles, *Cosmic rays, Gravity, Perturbation theory, Measurement, Atlantic Ocean, Mathematical analysis, Equations, Integral equations, USSR, Translations, Motion, Detection.

Contents:
General solution of the problem of the motion of an artificial satellite in the normal field of the earth's attraction.

Detection of radiation anomalies over the South Atlantic at heights of 310-340 km.

AD-288 531 Div. 12, 7
(TISTM/BRW) OTS price $3.60

Naval Ordnance Lab., Corona, Calif.
FEASIBILITY STUDY OF RESERVE LIQUID AMMONIA BATTERIES FOR GUIDED MISSILE FUZING,
by William C. Spindler. 1 Nov 62, 36p. incl. illus. tables.
(NAVWEPS rept. no. 7240) Unclassified report

DESCRIPTORS: *Guided missile batteries, *Primary batteries, Liquefied gases, Ammonia, Electrolytes, Guided missile fuzes, Power supplies, Electrochemistry, Feasibility studies.

A liquid NH3 battery is being developed to estimate its feasibility for short-life, reserve, primary applications. Specifications require three outputs (1.5 v at 0.5 amp, 150 v at 0.02 amp, and -30 v at 0.02 amp); activation time, less than 1 sec; life, greater than 2 min at ±6.7% voltage regulation; storage and operating temperature range, -55 to 75 C; and size, less than 6 cu in. All battery sections utilize a Mg/KSCN/NH4SCN-C-metadinitrobenzene/Ag electrochemical cell and liquid NH3 activation. Various stages in the battery development are illustrated and discussed. Its capability of meeting specifications appears promising; however, much work must be done before complete batteries will have been evaluated under all environmental conditions. The principle of liquid activation was shown to be feasible over the full temperature range, and the electrical output can easily be achieved within the available space. One critical component, an electrically initiated gas generator, is still to be developed to complete the simple practical method devised for storage and transfer of liquid NH3. (Author)

AD-288 538 Div. 12, 2
(TISTA/SEB) OTS price $3.00

Ohio State U. Research Foundation, Columbus.
FLIGHT ENVIRONMENT DESIGN PARAMETERS FOR MARS AND VENUS.
Final technical rept., pt. 2, on Preliminary Investigation of Interplanetary, Lunar, and Near Planet Environments,
by R. H. Zimmerman and C. D. Jones. Sep 62, 154p. incl. illus. tables, refs.
(Contract AF 33(616)5914, Proj. 6146)
(ASD TDR 62-805) Unclassified report

DESCRIPTORS: *Mars, *Venus, *Planetary atmosphere, *Atmosphere entry, Physical properties, Molecular weight, Specific heat, Density, Temperature, Pressure, Spaceships, Space probes, Orbital flight paths, Radiation effects, Gravity, Acceleration, Mathematical analysis, Theory, Atmosphere.

The physical characteristics of the planets Mars and Venus are assessed and probable quantitative limits are defined as minimum, representative and maximum probable values for application to environmental studies and equipment design. These data are applied to Chapman's generalized analysis for bodies entering planetary atmospheres to produce probable minimum, representative and maximum flight environment design parameters. These planetary parameters are applied with body and trajectory parameters, using Chapman's analysis, to selected direct, multipass and graze entries. (Author)

AD-288 576 Div. 12, 17
(TISTA/GEC) OTS price $11.00

Republic Aviation Corp., Farmingdale, N. Y.
THE MINIMUM WEIGHT DESIGN OF STRUCTURES OPERATING IN AN AEROSPACE ENVIRONMENT.
Final rept., 15 Jan-15 Nov 62 on Structural Design Criteria and Structural Analysis Methods, by H. Switzky. Oct 62, 1v. incl. illus. tables, 22 refs. (Rept. no. RAC 442-1; ARD-823-2)
(Contract AF 33(657)7872, Proj. 1467)
(ASD TDR 62-763) Unclassified report

DESCRIPTORS: *Hypervelocity vehicles, Airframes, Design, Space flight, Beams, Metal plates, Pressure, Load distribution, Mathematical analysis, Geometry, Sandwich panels, Deformation, Stresses, Structures.

A nondimensional design technique is developed to obtain the minimum weight of structural components (columns, plates, and beams) subjected to an aerospace environment. Design curves are developed and presented for various structural configurations in terms of the applied loads and geometric material parameters which can be read-

ily evaluated. The design technique can be employed to obtain, in a relatively simple and rapid manner, preliminary estimates of the structural design weight as well as a good approximation to the final design. The design procedure for minimum weight is illustrated for a truss-like spar and a wing section which are typical of aerospace structures. (Author)

AD-288 751 Div. 12
(TISTM/TCG) OTS price $1.10

Aerospace Information Div., Washington, D. C.
DETAILS ON SOVIET SPACE FLIGHTS.
27 June 62, 2p. (AID rept. no. 62-88; Trans. from TASS Report. On space and on self. A meeting of the cosmonauts with journalists. Pravda, 3p. 10 June 62)
Unclassified report

DESCRIPTORS: *Space flight, *Luminescence, *Particles, Gases, Liquids, Rocket motors.

AD-288 770 Div. 12, 6
(TISTW/RD) OTS price $7.60

Naval Supersonic Lab., Mass. Inst. of Tech., Cambridge.
EARTH SATELLITE OBSERVATIONS IN THE VISIBLE AND INFRARED WAVELENGTHS.
Quarterly status rept. no. 9, Sep-Nov 60, by R. Earl Good. Feb 61, 76p. (Technical rept. no. 466; DSR 8450)
(Contract AF 19(604)4547)
(AFCRL 288) Unclassified report

DESCRIPTORS: *Satellite vehicles, Detection, Tracking, Thermal radiation, Optical tracking, Infrared searchlights, Infrared tracking.

AD-289 016 Div. 12
(TISTW/RD) OTS price $2.60

Space Technology Labs., Inc., Redondo Beach, Calif.
ACCELEROMETER SENSITIVITY TO DYNAMIC PRESSURE PULSES,
by John R. Fowler and William S. Tierney.
June 62, 20p. incl. illus. tables, 2 refs.
(Rept. no. 6120-J101-KU-000; EM 12-10)
(Contract AF 04(694)1)
(BSD TDR 62-182) Unclassified report

DESCRIPTORS: *Accelerometers, *Guided missiles (Strategic), Test equipment, Instrumentation, Pressure, Crystals.

It is necessary to know the response to a dynamic pressure input when using accelerometers in pressure fields. In order to evaluate this effect, several different manufacturers' accelerometers were subjected to pressure pulses varying from approximately 20 psi to approximately 150 psi. The report shows the experimental equipment and presents the data obtained, showing comparisons between various accelerometers. (Author)

AD-289 028 Div. 12
(TISTA/SEB) OTS price $1.10

Aerospace Information Div., Washington, D. C.
INFORMATION OF THE VOSTOK-3 AND VOSTOK-4 FLIGHTS
2 Nov 62, 2p. (AID rept. no. 62-185; Trans. from The World's First Group Flight in Cosmic Space. Pravda, pp. 1-3, 22 Oct 62)
Unclassified report

DESCRIPTORS: *Spaceflight, Translations, Satellite vehicles, Launching, Recovery, Space cabins, Space capsules, Design, Van Allen radiation belt, USSR.

AD-289 036 Div. 12
(TISTB/LMH) OTS price $1.50

Battelle Memorial Inst., Columbus, Ohio.
HUMAN-INITIATED MALFUNCTIONS AND SYSTEM PERFORMANCE EVALUATION.
Final rept., Mar 61-Aug 62 on Human Performance in Advanced Systems,
by Roger C. Van Buskirk and Walter J. Huebner.
Sep 62, 47p. incl. illus. tables, 17 refs.
(Contract AF 33(616)7968, Proj. 7184)
(AMRL TDR 62-105) Unclassified report

DESCRIPTORS: *Guided missiles, *Human engineering, *Reliability, Design, Operation, Test methods, Factor analysis, Statistical analysis, Quality control, Effectiveness, Weapons.

This project is concerned with determining whether a system's performance conforms to its design objectives from consideration of failure data, including human-initiated malfunctions collected during development testing. In addition, the usefulness of this data for predicting the system's reliability was examined. The report discusses the interaction of human factors activities with other developmental testing activities. The relationship of the human-initiated malfunction to the reliability growth in development is examined. A method for monitoring performance and reliability during development is presented as an aid to determining whether or not a system conforms to its design objectives. (Author)

AD-289 210 Div. 12, 5
(TISTP/TL) OTS price $1.10

Sylvania Electronic Systems, Buffalo, N. Y.
SATELLITE DATA TRANSMISSION SYSTEM.
Interim engineering rept. no. 2, 16 Aug-15 Nov 62 on Satellite Data Transmission Program,
by S. N. Andre. 15 Nov 62, 7p.
(Contract AF 33(657)9043)
Unclassified report

DESCRIPTORS: *Satellite vehicles, *Data transmission systems, Air to surface, Diodes, Amplifiers, Feasibility studies, S band, High frequency, Frequency converters, Communication systems.

The Satellite Data Transmission System is a one-way satellite to earth data link which uses an adaptive satellite phased array to obtain a large antenna gain, thereby allowing a reduction in the vehicular power requirement. The adaptive property of the array allows the realization of a high gain communication beam without requiring accurate vehicle stabilization or the acquisition and tracking circuitry normally associated with narrow beam antennas. The analysis is divided into three main sections: phased array, tunnel diode amplifiers, and tunnel diode mixers. These are the three major components in the system. In each section, the design activities and experimental results which have been obtained are given. (Author)

Division 13 - INSTALLATIONS AND CONSTRUCTION

AD-289 376 Div. 12
(TISTW/PCR) OTS price $2.60

Illinois U., Urbana.
ANALYSIS OF MISSILE LAUNCHERS, PART 03 CURVATURE IN FLEXIBLE RAIL LAUNCHER MODELS.
Technical rept. on Dynamics of Missile Launchers, by M. Stern. Sep 62, 18p. incl. illus. (T&AM rept. no. 227)
(Contract DA 11-070-508-ORD-593)
Unclassified report

DESCRIPTORS: *Guided missile launchers, Flexible shafts, Equations, Railroad tracks, Curved profiles, Beams, Motion, Missile launchers, Mathematical analysis.

An analysis is presented of the massless beam model launcher including the effects of arbitrary initial rail curvature. The beam is pinned at one end, which yields results which are unobtainable from the earlier analysis. (Author)

AD-289 377 Div. 12
(TISTW/PCR) OTS price $2.60

Illinois U., Urbana.
ANALYSIS OF MISSILE LAUNCHERS, PART M2 MISSILE ON FLEXIBLE SHOES.
Technical rept. no. 225 on Dynamics of Missile Launchers,
by C. C. Fretwell. Sep 62, 24p. incl. illus.
(Contract DA 11-070-508-ORD-593)
Unclassified report

DESCRIPTORS: *Guided missile launchers, Flexible shafts, Equations, Shoes, Thrust, Springs, Missile launchers, Mathematical analysis.

An approximate analysis is presented of the motion of a flexible launcher on a flexible understructure, on which a missile supported by two flexible shoes moves under the action of a prescribed thrust force is described. The launcher system is represented by a uniform beam which is supported by a pin support and a rotational spring at one end and a linear spring at an interior point. The missile, assumed to be a rigid mass, is supported on the rail by two linear springs. The missile is also supposed to be rotating and mass unbalance effects are included. A pair of coupled integral equations are obtained which define the motion of the missile and a numerical technique is developed for their solution. (Author)

AD-289 422 Div. 12, 25, 15
(TISTP/JW) OTS price $1.10

General Electric Co., Burlington, Vt.
STUDY OF PARAMETERS WHICH AFFECT PELLET FLOW TYPE ACCELEROMETERS.
Monthly rept. no. 21, 1-28 Feb 62,
by A. T. Brown. 28 Feb 62, 3p.
(Contract DA 36-034-ORD-3230)
Unclassified report

DESCRIPTORS: *Electrostatics, *Fluid flow, Data processing systems, Mathematical analysis.

AD-289 575 Div. 12, 13
(TISTM/EJH) OTS price $2.25

Battelle Memorial Inst., Columbus, Ohio.
AN EVALUATION OF HIGH-PRESSURE OXYGEN SYSTEMS.
Final rept., 1 May 61-30 June 62 on Equipment for Life Support in Aerospace,
by J. V. Baum, B. Goobich and T. M. Trainer.
Sep 62, 85p. incl. illus. tables, 10 refs.
(Contract AF 33(616)8267, Proj. 6373)
(AMRL TDR 62-102) Unclassified report

DESCRIPTORS: *Spaceships, *Satellite vehicles, *Oxygen, *High pressure research, Vibration, Shock resistance, Contamination, Storage, Heating, Gas flow, Pressure vessels, Gas cylinders, Stainless steel, Plastics, Plastic seals.

An investigation was made of the relative safety of 7500-psi gaseous oxygen systems when used as a source of breathing oxygen in aerospace vehicles. Experiments were performed to investigate the effects on the system of temperature, vibration, shock, extended storage, and contamination. Also studied were the effects of high pressure, high-velocity flow, and heating due to rapid compression. Evaluation of the results of this program indicates that 7500-psi gaseous oxygen systems can be comparatively safe if proper safety precautions are taken. Under controlled operations, the hazard of explosion because of contamination can be overcome. Stainless steel and Monel alloys were found to be acceptable materials of construction. Teflon and Kel-F compounds appear to be suitable for seals. Hydrocarbons in minute concentrations were found not to be dangerously reactive. Electrostatic charges due to high-velocity flow were small, but there was evidence that erosion could be a serious problem. (Author)

AD-289 579 Div. 12
(TISTW/RD) OTS price $1.10

Inter-Range Instrumentation Group, White Sands Missile Range, N. Mex.
GLOBAL RANGE COORDINATE SYSTEM.
Nov 62, 5p. (IRIG Document no. 103-62)
Unclassified report

DESCRIPTORS: *Satellite vehicles, *Satellite vehicle trajectories, *Data transmission systems, Orbital flight paths, Range, Instrumentation, Position finding, Measurement, Tracking.

Contents:
Global range coordinate system
Coordinate system transmission problem
Recommended compromises
Recommended computational philosophy
Recommended reference spheroid and coordinate system
Recommended information and information sequence
Raw data and look-angles
Orbital parameters

13. INSTALLATIONS AND CONSTRUCTION

AD-287 982 Div. 13
(TISTB/LMH) OTS price $1.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
BARGES VERSUS PONTOONS.
Report on Type C,
by B. H. Bryner. 26 Oct 62, 12p. incl. illus. tables, 2 refs. (Technical note no. TN-461)
(Proj. Y-R011-01-039)
Unclassified report

DESCRIPTORS: *Barges, *Floats, Transportation, Water traffic, Bridges, Military operations, Amphibious operations, Feasibility studies.

A comparison is made of the pontoon, inflatable, and an integral hull (barge) type causeways to provide a basis for deciding if developmental work on a barge type causeway is warranted. The attributes of the three types of causeway are tabulated and discussed. A weight for each attribute is assigned and a comparison is made on this basis. The barge type does not appear to have a significant advantage over the other types to warrant development. (Author)

AD-287 983 Div. 13, 14
(TISTM/TCG) OTS price $1.25

Naval Civil Engineering Lab., Port Hueneme, Calif.
LONG-TIME CREEP OF PRESTRESSED CONCRETE I-BEAMS.
Final report on Type C,
by S. L. Bugg. 2 Oct 62, 44p. incl. illus. tables, 4 refs. (Technical rept. no. R-212)
(Proj. Y-R007-05-001)
Unclassified report

DESCRIPTORS: *Concrete, *Beams, *Creep, Manufacturing methods, Stresses, Load distribution, Materials, Deflection, Mixtures, Processing, Test methods.

This report covers the fabricating, prestressing, grouting and long-time loading of 22 post-tensioned prestressed concrete I-beams. These 42-foot members were subjected to loads varying in magnitude from dead load only to dead load plus 1.5 design live loads for periods of 74 to 80 months. The report contains data on the properties of the beam materials, shrinkage prior to prestressing, tendon elongations and long-time creep and deflection of the beams due to loads of various magnitudes. (Author)

AD-288 298 Div. 13
(TISTB/SAT) OTS price $1.60

Aerojet-General Corp., Azusa, Calif.
CRYOGENIC-SOLID COOLING TECHNIQUES.
Interim engineering rept., 6 July-30 Sep 62,
by L. E. Gross. Oct 62, 16p. incl. illus.
(Rept. no. 0694-01-1)
(Contract AF 33(657)8863)
Unclassified report

DESCRIPTORS: *Refrigeration systems, *Coolants, *Cryogenics, Liquefied gases, Solidified gases, Insulating materials, Heat transfer.

The design and development of an experimental model of a cryogenic-solid cooling system was undertaken. The current investigation of cryogenic coolant solidification techniques, as well as pressure and temperature control methods, is described. Conclusions and recommendations are made, based upon the progress of the work to date. (Author)

AD-288 482 Div. 13
(TISTM/TCG) OTS price $2.60

Illinois U., Urbana.
A NOTE ON THE LIMIT ANALYSIS OF GRID FRAMEWORKS,
by F. S. Shaw. June 62, 20p.
(Contract Nonr-183403, Proj. NR 064-183)
Unclassified report

DESCRIPTORS: *Structures, *Beams, *Bonded joints, *Plasticity, Mathematical analysis, Stresses, Theory.

AD-288 561 Div. 13, 14
(TISTM/TCG) OTS price $3.60

General Dynamics/Fort Worth, Tex.
MATERIALS - INTEGRAL FUEL TANK AND CABIN PRESSURE SEALANTS - HIGH TEMPERATURE RESISTANCE (325 F) - EVALUATION OF,
by H. M. Price. 2 Nov 62, 21p. tables (Rept. no. FTDM-2141)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Sealing compounds, *Fuel tanks, *Pressurized cabins, *Synthetic rubber, Heat resistant polymers, Polymerization, Viscosity, Tensile properties, Adhesion, Deformation, Corrosion, Elasticity, Stability, Extrusion, Physical properties, Mechanical properties, Cleaning, Sheets, Metals, High temperature research.

Integral fuel tank and cabin pressure sealants currently used on the B-58 airplane were developed with a maximum operating temperature of 275 F as a goal. Tests were made to screen and evaluate presently available high temperature sealants at 325 F, and to determine their sealing capabilities. Results showed that 325 F was very detrimental to the physical properties of the sealants. The most outstanding effects observed in all high temperature tests were shrinkage, embrittlement, and blowing. In the case of one material depolymerization was noted. Fluid exposures at 170 F did not appear to have such a radical effect upon the sealants as did the 325 F tests. However, all materials displayed a tendency to swell and become spongy during fuel exposure. All specimens which were subjected to 325 F following fuel exposure were destroyed by the heat. (Author)

AD-288 609 Div. 13, 22, 26
(TISTW/PCR) OTS price $3.60

Picatinny Arsenal, Dover, N. J.
PHILOSOPHY AND APPLICATIONS OF PROTECTIVE WALL DESIGN TECHNIQUES,
by Leon W. Saffian and Richard M. Rindner. Nov 62, 27p. incl. illus. 2 refs. (Technical memo. no. 1062)
Unclassified report

DESCRIPTORS: *Levees, Explosive forming, Explosives, Storage, Safety, Sensitivity, Thickness, Reinforced materials, Spallation, Structures, Blast, Velocity, Vulnerability, Shear stresses, Explosion damage, Design.

The design or capacity of a protective wall or combination of walls must be determined when considering an explosives manufacturing and/or storage situation. Although the Ordnance Safety Manual gives guide lines for establishing barricades and substantial dividing walls which have been effective for many years, a detailed, quantitative procedure for assessing the degree of protection which may be expected from existing protective walls or designing new walls is not available. Developing protective wall design criteria has been primarily concerned with relatively distant effects of explosions where a plane wave approach may be employed. Although situations of this sort are of occasional interest to Ordnance, the majority of cases are concerned with close-in effects where explosives are in relatively close proximity to the protective wall. Application of the plane wave theory is not valid because of the non-uniformity of wall loading in such cases. The need for the development of more quantitative and precise safety design criteria was recognized some time ago when Picatinny Arsenal initiated a broad

program in this area. One of the ultimate objectives of this program was the establishment of structural design criteria for protective walls. These analytical studies are now near completion. (Author)

AD-288 775 Div. 13, 1
(TISTM/TCG) OTS price $1.10

Marine Corps Development Center, Quantico, Va.
BULK FUEL POD FOR ASSAULT TRANSPORT HELICOPTERS.
Final rept.
1961, 7p.
(CMC Proj. no. 45-58-02D)
Unclassified report

DESCRIPTORS: *Fuel storage tanks, *Refueling in flight, *Helicopters, Fuel tanks, Textiles, Containers, Tests, Military requirements.

AD-288 793 Div. 13
(TISTW/RD) OTS price $12.00

Illinois U., Urbana.
NUMERICAL STUDIES OF THE DYNAMIC RESPONSE OF SHALLOW-BURIED ARCHES SUBJECTED TO BLAST LOADING,
by Caryll R. Whipple. Aug 61, 58p. illus. tables.
(Contracts AF 29(601)2591 and AF 29(601)4508, Proj. 1080)
Unclassified report

DESCRIPTORS: *Underground structures, Shock waves, Soils, Reinforced concrete, Blast.

AD-288 914 Div. 13
(TISTB/AW) OTS price $5.00

Naval Radiological Defense Lab., San Francisco, Calif.
DESIGN MODIFICATIONS AND 1962 COST ANALYSIS FOR A STANDARDIZED SERIES OF FALLOUT SHELTERS,
by Lewis G. Porteous. 17 Sep 62, 125p. incl. illus. tables, 12 refs. (Rept. no. NRDL-TR-582)
Unclassified report

DESCRIPTORS: *Shelters, Civilian defense systems, Construction, Design, Costs, Standardization, Blast, Ventilation, Shielding, Particulate filters, Dosimeters, Periscopes, Water supplies, Fuel storage tanks, Electric power production, Sanitary engineering, Radio equipment, Radioactive fallout.

Major emphasis is on recent design modifications and 1962 cost estimates for the personnel fallout shelter described in USNRDL-TR-366, Specifications and Costs of a Standardized Series of Fallout Shelters (1959). The shelter is designed to accommodate at least 100 persons for 14 days. The shelter will provide the specified fallout and blast protection, the required interior environment, and the essential ''hotel-type'' equipment at minimum cost. The shelter items are specified by several packages, each having one or more different arrangements of items, depending on the degrees of protection and comfort desired. The proper selection of packages will result either in a 35-psi or 10-psi blast and fallout shelter sited above or below grade. The radiation protection factor is at least 1000. ''Most austere'' to ''least austere'' living accommodations can be selected. Average cost data for the packages by item are tabulated for quantities up to 1000. Respective costs (less overhead, profit, etc.) for 4 complete shelters are estimated and presented graphically. The costs range from $19,800 for the least-austere 35-psi shelter to $14,200 for the most-austere 10-psi shelter. The design modifications are based on findings of the USNRDL Shelter Research Program for the period, 1959 to June 1962. (Author)

14. MATERIALS (NON-METALLIC)

AD-287 900 Div. 14, 26 , 17
(TISTM/ODN) OTS price $4.60

Mechanical Technology Inc., Latham, N. Y.
BEARING MATERIALS FOR PROCESS FLUID LUBRICANTS.
Progress rept.
by M. B. Peterson. 11 Sep 62, 39p. incl. illus. tables, 53 refs. (Rept. no. MTI-62TR20)
(Contract Nonr-373100)
Unclassified report

DESCRIPTORS: *Bearings, *Lubricants, Friction, Materials, Corrosion, Erosion, Metals, Transition elements, Oxygen, Chlorine, Dioxides, Sulfur compounds, Carbon compounds, Failure (Mechanics), Hardness, Temperature, Surfaces, Oxides, Films, Solubility, Alloys, Metallic compounds, Molybdates, Tungstates, Crystal structure, Thermal conductivity, Melting, Crystallization, Fluids.

It was concluded that 3 major problems must be solved before a material could be considered: corrosion, erosion, and sliding damage. Potential corrosion resistant base materials were selected from literature sources. These materials are: Al, Cr, Co, Cu, Ta, Ni, Ti, Zr, Hf, Fe, Au, Ag, and Pt. Bi, Re, and W are also included for special purposes. Temperature limits are suggested as well as the effects of O2, C1, CO2, SO2, insofar as these data are available. These are considered to be the main factors in various waters. Consideration was given to solubility, formation of soft oxide films, crystal structure, melting temperature, recrystallization temperature, thermal conductivity, and hardness. Based on these factors, Co, Cu, Au, and Pt alloys are considered most promising in the temperature range 350-500 F. Plastics are considered most promising at temperatures below 350 F. The primary unanswered question is that of the oxide film and its effectiveness. Experiments are proposed to determine if an oxide is formed and if surface damage can be prevented. (Author)

AD-287 914 Div. 14, 8
(TISTM/BRW) OTS price $4.60

New Jersey Ceramic Research Station, Rutgers U., New Brunswick.
DEVELOPMENT OF REFRACTORY CERAMICS THAT CAN BE PROCESSED AT TEMPERATURES CONSIDERABLY LOWER THAN THEIR MAXIMUM USE TEMPERATURE.
Quarterly progress rept. no. 2, 1 July-1 Oct 62,
by Edward J. Smoke and John H. Koenig. 1 Oct 62, 42p. incl. illus. tables.
(Contract NOw 62-0710-d)
Unclassified report

DESCRIPTORS: *Refractory materials, *Ceramic materials, Aluminum compounds, Magnesium compounds, Oxides, Silicon compounds, Dioxides, Heat treatment, Phase studies, Density, Absorption, X-ray diffraction analysis, Radomes, Time, Temperature, Sintering, Processing.

A presintering study was initiated to determine the densification mechanisms of a high alumina body utilizing the presintering process. The effect of increasing the presintering temperatures and final firing temperatures upon density and phase formations are shown. An investigation was initiated to study the densification and sintering in vacuum of pure alumina and alumina with small additions of magnesia. Specimens were

fired at 1550, 1650, 1700 and 1750 C with 1-hr soaking time. Results indicate that mature bodies were obtained for all compositions between 1550 and 1650 C. Densities at or near theoretical were obtained for the two compositions containing magnesia. (Author)

AD-287 917 Div. 14, 2, 4
(TISTM/ODN) OTS price $8.10

Snell, Foster D., Inc., New York.
RAIN REPELLENT.
Quarterly interim rept. no. 1, 20 Mar-20 June 62, by M. Friedman, E. McDonnell, and J. Mitchell Fain. 27 June 62, 78p. incl. tables.
(Contracts NOw 62-0557-c, NOw 61-0463-c and NOas 60-6029-c)
Unclassified report

DESCRIPTORS: *Antirain agents, *Raindrops, *Silanes, Sprays, Water, Alkoxy radicals, Methyl radicals, Esters, Coatings, Glass, Silicones, Oils, Titanium compounds, Copolymerization, Polymers, Wetting agents, Test equipment.

The rain spray apparatus was modified to permit evaluation of rain repellent formulations applied during rain conditions. Means were provided to deliver the rain spray and the spray of the repellent solutions simultaneously. The use of surfactants incorporated in acidified dimethyldiethoxysilane did not improve repellency during rain conditions. The use of Ti in ester form alone and in conjunction with silane and silicones makes possible the formation of coatings on glass under rain conditions which permit visibility, but have short life. (Author)

AD-287 918 Div. 14, 2, 4
(TISTM/ODN) OTS price $4.60

Snell, Foster D., Inc., New York.
RAIN REPELLENT.
Quarterly Interim rept. no. 2, 21 June-20 Sep 62, by M. Friedman, E. McDonnell, and J. Mitchell Fain. 28 Sep 62, 44p. incl. tables.
(Contracts NOw 62-0557-c, NOw 61-0463-c and NOas 60-6029-c)
Unclassified report

DESCRIPTORS: *Antirain agents, *Raindrops, *Silanes, Phosphates, Titanium compounds, Methyl radicals, Alkoxy radicals, Water, Copolymerization, Sodium compounds, Sulfates, Hydrogen compounds, Polymers, Boron compounds, Aluminum compounds, Catalysts, Test equipment, Wetting agents, Films.

Certain proprietary gels containing phosphates of Ti were not found useful as rain repellants either alone or in combination with acidified dimethyldiethoxysilane. The use of mutual solvents for water and acidified dimethyldiethoxysilane did not improve application under rain conditions. A combination of silicone-Ti copolymer and dimethyldiethoxysilane was investigated for application in continuous stream under rain conditions and when applied in conjunction with a $NaHSO_4$ paste on a dry panel. It was found effective for both uses. (Author)

AD-287 934 Div. 14, 31
(TISTM/EJH) OTS price $1.60

Battelle Memorial Inst., Columbus, Ohio.
MECHANISM OF WATER ABSORPTION IN GLASS-REINFORCED PLASTICS.
Quarterly rept. no. 1, 1 July-1 Oct 62, by D. W. McNeil, B. Bennett and R. I. Leininger. 1 Oct 62, 16p. incl. illus. table, 56 refs.
(Contract NObs-86871, Proj. SR-007-03-04)
Unclassified report

DESCRIPTORS: *Filament wound construction, *Laminates, *Glass textiles, Plastics, Composite materials, Structures, Underwater, Water, Absorption, Hydrostatic pressure, Deterioration, Submarines, Epoxy resins, Test methods.

The objective of this program is to determine the mechanism of water absorption by glass-reinforced structures, specifically, filament-wound laminates. Elucidation of this mechanism will be of material value in the design of deep-submergence vehicles. Experimental work was initiated with the preliminary exposure of epoxy resin slugs to hydrostatic pressure of 10,000 psi and examining them periodically for weight gain and structural changes. After 23 days' immersion at this high pressure and room temperature, maximum water absorption as reflected in weight gains was 0.5 per cent. No changes in structure were observed in 0.3-micron-thick sections cut from the exposed samples. Optimum sample configuration was established - a three-piece, hollow cylindrical construction - and samples were prepared from epoxy resin and from filament-wound cylinders. (Author)

AD-287 969 Div. 14
(TISTB/MD) OTS price $1.60

General Dynamics/Fort Worth, Tex.
MATERIAL. SILICONE RUBBER COMPOUNDS. PHYSICAL CHARACTERISTICS, INVESTIGATION OF,
by Jack W. Swain and J. R. Mathis. 26 Oct 62, 13p. incl. illus. tables (Rept. no. FTDM-1597)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Synthetic rubber, *Silicones, Tensile properties, Elasticity, Hardness, Processing, Polymers, Physical properties.

Tensile strength, percent elongation, durometer and tear strength of some new silicone rubber products and compounds submitted by various vendors were determined. This data could be used to establish procurement specifications for the purchase and control of similar products in the future. Compression set properties and processing characteristics were also investigated.

AD-287 970 Div. 14
(TISTM/TCG) OTS price $1.60

General Dynamics/Fort Worth, Tex.
MATERIALS. ETHEREFIED PHENOLIC RESINS. HIGH TEMPERATURE RESISTANT. DEVELOPMENT OF,
by G. L. Greenfield. 26 Oct 62, 16p. incl. illus. tables, 3 refs. (Rept. no. FGT-2331)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Heat resistant polymers, *Phenolic resins, *Formaldehyde, *Ethers, Laminates, Catalysts, Chemical reactions, Temperature, Deterioration, Acids, Hydroxides, Allyl radicals, Chlorides, Heat, Decomposition, Stability, Shear stresses, Laboratory equipment, Synthesis.

Phenol-formaldehyde resins were prepared using both acid and base catalysis in attempting to determine which method would produce the best resin to etherify. These resins were etherified with epichlorohydrin. The etherified acid catalyzed phenol-formaldehyde resins were (based

on heat deterioration test of the cured resin) superior to the base catalyzed counterpart. Acid catalyzed phenol-formaldehyde resins were etherified with allyl chloride or methallyl chloride. The resulting polymers could not be cured with free radical catalysts. Acid catalyzed phenol-formaldehyde resins etherified with epichlorohydrin and cured with p,p'-diaminodiphenyl-sulfone had good heat stability at 500 F and good adhesive properties. Comparison of this material with the best commercially available adhesive material showed the laboratory prepared adhesive to have the greater lap shear strength after aging 100 hr at 500 F. Acid-catalyzed phenol-formaldehyde resins etherified with epichlorohydrin were investigated as high temperature laminating resins. The results were unsatisfactory. (Author)

AD-287 973 Div. 14
(TISTM/TCG) OTS price $1.10

General Dynamics/Fort Worth, Tex.
MATERIAL - SEALERS - SILICONE MOLDED PLASTIC PARTS - EVALUATION OF,
by J. L. Perry. 26 Oct 62, 4p. illus. (Rept. no. FTDM-2672)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Silicone resins, *Glass textiles, *Plastics, *Sealing compounds, Plastic seals, Fibers, Epoxy resins, Effectiveness, Impregnation, Silicones, Seals.

Leakage rates of C4-1250 silicone-glass molded parts with (1) no resin seal, (2), C-274 silicone-epoxy seal, and (3) XR6-3000 seal were determined. Neither of the resin seals appeared to reduce the leakage rate (in comparison to the control), and the leakage rate did not appear to be influenced by the length of fiber used in the test specimens. (Author)

AD-287 974 Div. 14
(TISTB/MD) OTS price $1.60

General Dynamics/Fort Forth, Tex.
ENGINEERING RESEARCH - MATERIAL - NEW HIGH TEMPERATURE SILICONE POLYMERS - DEVELOPMENT OF,
by G. L. Greenfield. 16 Feb 61, 9p. incl. illus. (Rept. no. ERR-FW-077)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Silanes, *Polymers, Styrenes, Methyl radicals, Heat-resistant polymers, Bromides, Chlorides, Synthesis.

The materials research and development conducted under this program was aimed at obtaining thermally stable compounds for use on advanced aerospace vehicles. Because of their promise as high temperature materials, substituted silicon and silicone polymers were chosen for study. Since all the silicon compounds to be prepared could be derived from the unsaturated silicone, Bis-(p-styryl)dimethylsilane, the major portion of the work was directed toward preparation of this silicone. A search of the literature revealed that the intended 4-step approach was unpredictable and would lead to very low yields. This was also borne out by preliminary efforts. An alternative approach was undertaken late in the program to prepare the Bis-(p-styryl)dimethylsilane. This was a 3-step process: (1) preparation of Bis-(p-bromophenyl)dimethylsilane; (2) further reaction of (1) to Bis-(p-1-hydroxyethylphenyl)dimethylsilane; (3) dehydration of (2) to Bis-(p-styryl)dimethylsilane. Slow delivery of necessary chemicals and pioneering nature of the research delayed the program allowing only steps (1) and (2) of the alternative process to be conducted as of this writing. (Author)

AD-287 993 Div. 14, 32
(TISTM/TCG) OTS price $2.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
A SURVEY OF THE DETERMINATION OF MOLECULAR WEIGHT AND MOLECULAR WEIGHT DISTRIBUTION OF POLYETHYLENE,
by William J. Powers and David W. Levi. Oct 62, 27p. 56 refs.
(Picatinny Arsenal technical rept. no. 3026)
Unclassified report

DESCRIPTORS: *Polymers, *Ethylenes, *Bibliography, *Plastics, Molecular weight, Physical properties, Literature.

A discussion of the special problems involved in determining the molecular weight of polyethylene is followed by a 56-item annotated list of references on the same subject. (Author)

AD-287 998 Div. 14, 4
(TISTM/ODN) OTS price $1.60

Smith, A. O. ,Corp., Milwaukee, Wis.
GLASS SURFACE CHEMISTRY FOR GLASS FIBER REINFORCED PLASTICS.
Monthly progress rept. no. 8, 1 Oct-31 Oct 62, on Effect of Glass Surface Chemistry on Wetting Bond Strength and Bond Life. 31 Oct 62, 10p. incl. illus. tables, 5 refs.
(Contract NOw 62-0679-c)
Unclassified report

DESCRIPTORS: *Glass textiles, *Plastics, *Reinforcing materials, Glycerols, Surfaces, Bonding, Resins, Water, Surface tension, Mass spectrometers, Fibers, Epoxy resins, Wetting agents, Solutions.

Hot water debonded the resin rapidly in the absence of a coupling agent or a special glass surface condition. The dominant mechanism of debonding was water penetration along the glass-resin interface (edge). Bond life and wetting studies are summarized. Surface roughness appeared to promote wetting by water of the A-1100 treated glass surfaces. Four more contact angle measurements by the captive bubble technique are needed to complete the required wetting studies. Valuable refinements of the butt-joint tube method were advanced. The refinements included allowing the resin to shrink freely and eliminating the notch effect in the resin column design. Glass surfaces tested by mass spectrometry techniques to detect the presence of A-1100 are listed. Surface tension data for all test liquids used in the wetting studies are also presented. (Author)

AD-288 004 Div. 14, 1
(TISTM/ODN) OTS price $1.10

General Dynamics/Fort Worth, Tex.
MATERIAL - FABRIC - FIRE SEAL - WIRE REINFORCED RUBBER COATED - EVALUATION OF,

by Norris D. Taylor. 26 Oct 62, 3p. incl. table. (Rept. no. FTDM-2033)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Rubber coatings, *Seals, Silicones, Synthetic rubber, Fires, Wire, Reinforcing materials, Specifications, Coatings, Deterioration, Mechanical properties, Absorption, Tests, Materials, Airplanes.

AD-288 033 Div. 14
(TISTM/ODN) OTS price $2.60

Forest Products Lab., Madison, Wis.
CHEMICAL PULPING AND WALLBOARD EXPERIMENTS WITH SUNDRI (HERITIERA MINOR) WOOD,
by M. A. Razzaque. Sep 62, 10p. tables, refs. (Rept. no. 2253)
Unclassified report

DESCRIPTORS: *Wood pulp, *Wood, Manufacturing methods, Trees, Phenolic resins, Absorption, Preparation, Mechanical properties.

Kraft, neutral sulfite semichemical, and cold soda pulps from East Pakistan were prepared and evaluated, and the suitability of low-chemical cold soda and steam-cooked pulps for making hardboards determined. Experiments were conducted to determine the feasibility of making medium-density and insulation boards from steam-cooked pulps by press-drying. The strength of the pulps compared favorably with that of pulps from such North American broad-leaved species as aspen. The tearing strength of the sundri kraft pulp was higher than that of most hardwood kraft pulps. The strength properties were better than those obtained from gewa, another hardwood species from East Pakistan. Sundri chips, softened by cold soda impregnation and reduced to high-yield pulp in an attrition mill, were used for making hardboards. Heat-treated hardboards, containing 1% phenolic resin, were of good flexural strength and fairly resistant to water. Hardboards with better water resistance can be expected from freshly cut wood than from the stored wood used in these experiments. The hardboards made with defibrated pulps possessed good water absorption characteristics. (Author)

AD-288 034 Div. 14, 16
(TISTB/LMH) OTS price $1.60

Forest Products Lab., Madison, Wis.
PACKAGING RESEARCH AT THE U. S. FOREST PRODUCTS LABORATORY,
by F. J. Champion. Sep 56, rev. Sep 62, 7p. illus. (Rept. no. 2064)
Unclassified report

DESCRIPTORS: *Containers, *Packaging, *Plywood, Production, Military requirements, Design, Materials, Wood, Wood pulp fibers.

Research in packaging practices has developed the fundamentals of fiber container engineering as well as provided the basic test methods and instrumentation devices for the evaluation of new package designs, methods, and materials. The Laboratory staff is directly responsible for setting up packaging courses for the Armed Forces and training instructors to continue these courses on a permanent basis. Laboratory packaging research includes: modifications of large crates to make them adjustable and economical either for air or surface shipment; 5-year outdoor exposure tests of field picking (agricultural crop) boxes treated with various preservatives and water repellants; development of new pallet constructions, including bin pallets employed in the harvesting and shipment of agriculture products; evaluation of paper-overlaid veneer as panel material in cleated panel boxes; determination of the holding power of metal fastenings and adhesives under impact loading; preparation of design criteria for cushioning materials; and a thorough evaluation of double-wall and triple-wall fiberboard boxes. (Author)

AD-288 037 Div. 14
(TISTM/TCG) OTS price $1.10

Aerospace Information Div., Washington, D. C.
SOVIET TRENDS IN ORIENTED GLASS-FIBER REINFORCED PLASTICS,
by G. D. Andreyevskaya. 25 Oct 62, 4p. (AID rept. no. 62-173; Trans. from Physicochemical properties of oriented glass-fiber plastics. Akademiya nauk SSSR, Vestnik No. 5, pp. 65-69, May 62)
Unclassified report

DESCRIPTORS: *Glass textiles, *Reinforcing materials, *Plastics, Fibers, Binders, Textiles, Processing, Adhesion, Elasticity, Viscosity, Deformation, Physical properties, Epoxy resins, Polymers, Styrenes, Silicates, USSR, Mechanical properties.

The physicomechanical properties of glass-fiber reinforced plastics include glass-fiber strength and orientation in the binder; mechanical and physicochemical properties of the thin binder coats which develop fibers and insure simultaneous deformation; adhesion of binder to fiber; ability of fiber to be wet by binder; and homogeneous distribution of binder between fibers. The two main problems facing Soviet scientists are the efficient utilization of the properties of the components and the development of reinforced systems in which fiber and binder have optimum mutual affinity. (Author)

AD-288 088 Div. 14
(TISTM/TCG) OTS price $2.60

Wyandotte Chemicals Corp., Mich.
SYNTHESIS OF LOW TEMPERATURE CHEMICAL RESISTANT URETHANE ELASTOMERS,
Quarterly progress rept. no. 1, 1 July-30 Sep 62.
1 Oct 62, 19p. incl. illus. tables.
(Contract DA 20-018-ORD-24883)
Unclassified report

DESCRIPTORS: *Urethanes, *Elastomers, *Urea, Synthesis, Statistical analysis, Organic compounds, Amines, Hydroxides, Isocyanic acids, Polymers, Anilines, Chlorides, Ethylenes, Propenes, Chemical reactions, Ethers, Tensile properties, Oils, Aging, Physical properties, Moisture, Absorption, Hardness, Elasticity, Low temperature research, Chemicals.

The preparation of urethane-urea elastomers was investigated. A statistically designed set of experiments was completed investigating 5 variables at 2 levels. Two aromatic diamines were compared at two levels of amine to hydroxyl ratio. Two aromatic diisocyanates at 2 levels of concentration were also compared. Two polyols of 1500 equivalent weight were utilized to round out the 5 variables. These polyols are PLURACOL TP-4542 and Teracol 30. The use of ortho dichlorobenzidine (DCB) at a 1.5 NH2/OH ratio in combination with tolylene diisocyanate and the polypropylene-ethylene ether triol came the closest to meeting the Army specification for an oil resistant rubber with good low temperature flexibility. (Author)

AD-288 146 Div. 14
(TISTM/MBW) OTS price $1.60

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
MICROSTRUCTURE STUDIES OF POLYCRYSTALLINE REFRACTORY OXIDES.
Quarterly progress rept. no. 1, 12 June-12 Sep 62,
by T. Vasilos, R. M. Spriggs, and J. Mitchell.
7 Nov 62, 19p. incl. illus. table, 12 refs.
(Rept. no. RAD-SR-62-219)
(Contract Now 62-0648c)
Unclassified report

DESCRIPTORS: *Refractory materials, *Aluminum compounds, *Magnesium compounds, *Oxides, Microstructure, Crystals, Grains (Metallurgy), Ceramic materials, Density, Porosity, Failure (Mechanics), High temperature research, Test equipment, Tensile properties.

A mechanical testing machine was designed and constructed to determine the elastic modulus and modulus of rupture for transverse bending of high-density alumina and magnesia at elevated temperatures. Log-log plots of room-temperature strength (extrapolated to zero porosity) versus grain size for alumina revealed the relationship: S = 86,000 G to the minus 1/3 power (psi) where G = grain size in microns, and S = 50,000 G to the minus 1/6 power (psi) for heat-treated specimens of magnesia. A large number of test specimens of dense alumina and magnesia were fabricated with fine grain microstructure (about 2 to 3 microns average size). Others are being machined from fabricated blanks, and specimens with larger grain size are being prepared by heat treating. Specimens prepared to date have an average grain size range of 2 to 130 microns. (Author)

AD-288 230 Div. 14
(TISTM/EJH) OTS price $13.50

Oklahoma U. Research Inst., Norman.
AGING OF CURE DATED ITEMS AND VARIOUS ELASTOMERIC COMPOUNDS.
Final rept.,
by R. Mortensen, R. Grigsby and others.
31 Jan 62, 182p. incl. illus. tables, refs.
(Contract AF 34(601)5233, Proj. 1190-18)
Unclassified report

DESCRIPTORS: *Rubber, *Synthetic rubber, *Elastomers, *Aging, *Bibliography, Mechanical properties, Vaporization, Neutron bombardment, Radiation effects, Stresses, Elasticity, Viscosity, Seals, Organic solvents, Solvent action, Temperature, Test equipment, Test methods.

Contents:
Correlations between natural and accelerated aging and mechanical properties
Vapor phase swelling
Vapor phase swelling studies with the quartz beam microbalance apparatus
Vaporization of volatile components in the rubber
Neutron irradiation of rubber
Swelling behavior under stress conditions
Removal of 1010 oil from O-rings
Leaching of constituents from O-rings
Temperature retraction apparatus
Bibliography

AD-288 231 Div. 14, 1
(TISTM/TCG) OTS price $9.60

Oklahoma State U. School of Mechanical Engineering, Stillwater.
STUDY IN THE FIELD OF FLUID CONTAMINATION AND THE METHODS REQUIRED TO RESTORE AND EVALUATE THE CONTAMINANT CAPACITY OF USED FILTER ELEMENTS.
Rept. no. 4 on Fluid Contamination Project,
by E. C. Fitch, O. J. Burchett and others.
Sep 61, 111p. incl. illus. tables, refs.
(Contract AF 34(601)5470)
Unclassified report

DESCRIPTORS: *Hydraulic fluid filters, *Hydraulic fluids, *Contamination, *Ultrasonics, Cleaning, Fluids, Fluid mechanics, Flotation, Fluid flow, Separation, Pressure, Particles, Organic solvents, Transducers, Effectiveness, Transport properties, Ultrasonic properties, Viscosity, Centrifugal pumps, Chemical engineering, Bubbles, Aircraft.

Contamination of hydraulic fluid filters was investigated. Performance equations for hydroclone operation were developed and experimentally verified. Hydroclones demonstrated 100% separation efficiencies for 10-micron particles. A semi-automatic hydroclone test stand was developed for obtaining separation efficiency of a filter (either hydroclone or conventional element) and for evaluation of cleaning methods. Contamination equipment included the Coulter particle counter, a chemical cleaning stand, an ultrasonic cleaning facility, and a filter evaluation stand. KC-135 and F-105 filter elements and hydraulic fluid samples were evaluated.

AD-288 243 Div. 14, 4
(TISTM/BRW) OTS price $1.25

Rock Island Arsenal Lab., Ill.
ORGANIC COATING USING THE FLUIDIZED BED TECHNIQUE,
by L. O. Gilbert. 20 Sep 62, 48p. incl. illus. tables (Rept. no. 62-3183)
Unclassified report

DESCRIPTORS: *Coatings, *Organic coatings, Plastic coatings, Powders, Sintering, Epoxy resins, Nylon, Polymers, Ethylenes, Chlorides, Cellulose acetates, Propenes, Fluorides, Metals, Processing.

The fluidized bed coating process is sometimes referred to as powder painting or simply plastic cladding. Process details, advantages and deficiencies of the process as compared with conventional coating methods, as well as tricks of the trade, are covered. Masking, cold fixturing techniques, patching of the coatings, inspection techniques, machining, and special applications of the coatings are discussed. Use of the process in applying both plastic and metallic coatings reveals an envisioned future application of fluidized bed techniques. (Author)

AD-288 273 Div. 14
(TISTM/BRW) OTS price $4.60

Pennsylvania State U. Coll. of Mineral Industries, University Park.
ANISOTROPY AND STRENGTH OF CERAMIC BODIES.
Progress rept. no. 4, 15 July-15 Oct 62,
by W. R. Buessem and H. A. McKinstry. 19 Oct 62, 39p. incl. illus. tables, 7 refs.
(Contract Nonr-65627)
Unclassified report

DESCRIPTORS: *Ceramic materials, Aluminum compounds, Titanates, Lithium compounds, Silicates, Thermal expansion, Crystal structure, Lattices, Measurement, Sintering, Stresses, Dilatometers, Thermal stresses, Mechanical properties.

The thermal expansion behavior of aluminum

titanate, Beta-eucryptite, and Beta-spodumene was investigated to correlate the aggregate's thermal expansion with that of the crystal lattice thermal expansion. (Author)

AD-288 430 Div. 14
(TISTM/TCG) OTS price $1.60

Imperial Glass Corp., Bellaire, Ohio.
DEVELOPMENT WORK ON IMPROVED HIGH MODULUS STRUCTURAL GLASS FIBER.
Quarterly progress rept. no. 7, 1 June-31 Aug 56,
by R. R. Bastian, Axel Ottoson, and W. C. Orme.
19 Sep 56, 5p.
(Contract NOa(s) 55-213)
Unclassified report

DESCRIPTORS: *Glass textiles, *Fibers, Mechanical properties, Elasticity, Physical properties, Laboratory furnaces, Glass, Crystallization.

AD-288 458 Div. 14, 4
(TISTM/ODN) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CORROSION OF COPPER AND ITS ALLOYS IN HYDROFLUORIC ACID,
by E. I. Antonovskaya and Yu. N. Vil'k.
1 June 62, 6p. (Trans. no. FTD-TT-62-724 from Khimicheskaya Promyshlennost', No. 6, pp. 61-62, 1961)
Unclassified report

DESCRIPTORS: *Copper alloys, *Corrosion, Alloys, Fluorides, Hydrogen compounds, Acids, Solutions, Temperature, Brass, Bronze.

AD-288 555 Div. 14
(TISTM/ODN) OTS price $1.10

General Dynamics/Fort Worth, Tex.
EVALUATION OF EPOXY AERODYNAMIC SMOOTHER.
Process Control Test rept.,
by W. M. Young. 2 Nov 62, 4p. incl. table.
(Rept. no. PCTR-4480)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Epoxy resins, *Aerodynamics, Plastics, Aluminum, Steel, Extrusion, Viscosity, Adhesion, Physical properties.

Epoxy aerodynamic smoother materials were evaluated and tested with respect to working viscosity, extrusion rate, application time, adhesion, and physical properties. A Baldwin tensile testing machine was used.

AD-288 556 Div. 14, 1
(TISTM/ODN) OTS price $1.60

General Dynamics/Fort Worth, Tex.
HYDRAULIC SYSTEM - ORONITE 8515 PRESERVATIVE FLUID - EVALUATION OF,
by R. H. McDaniel. 30 Oct 62, 13p. incl. illus. tables, 8 refs. (Rept. no. FGT-2228)
(Contracts AF 33(600)36200 and AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Hydraulic fluids, *Hydraulic systems, Airplanes, Chemical properties, Physical properties, Corrosion inhibition, Storage, Stability, Low temperature research, High temperature research, Tests, Viscosity, Calcium compounds, Sulfonates, Petroleum, Lubricant additives.

Three formulations of preservative fluids for screening to determine their suitability for protection and storage of B-58 hydraulic units were prepared. These fluids contained the inhibitor calcium petroleum sulfonate. They were blended from base stocks of Oronite 8515 high temperature hydraulic fluid. Physical and chemical property tests designed to disclose degree of rust prevention as well as similarities and differences to those of Oronite 8515 were conducted. Very high neutralization numbers of all three fluids would possibly make flushing of parts necessary prior to installation. (Author)

AD-288 559 Div. 14, 1
(TISTM/EJH) OTS price $7.60

General Dynamics/Fort Worth, Tex.
MATERIAL - ADHESIVE PLASTILOCK 650 EVALUATION TESTS,
by C. F. Laue. 7 Nov 62, 69p. incl. illus. tables (Rept. no. FGT-1878)
(Contracts AF 33(600)32841 and AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Adhesives, *Airframes, *Bonding, Aluminum, Stresses, Shear stresses, Sea water, Test methods, Temperature, Military requirements.

Plastilock 650 adhesive was recommended for use as a metal-to-metal adhesive in certain bonded component parts of the B-58 airframe. Three production rolls of Plastilock 650 adhesive were submitted for evaluation. The adhesive was bonded to 2024 T-3 alclad aluminum and tested for the requirements of specification FMS-0057 and military specification MIL-A-8431 (Type I adhesive). Plastilock 650 (Rolls AO 3304, 3306, 3307) met the requirements except for the minimum lap shear specimen values for 75 F and 30-day exposure to salt spray. (Author)

AD-288 560 Div. 14, 26
(TISTM/TCG) OTS price $1.10

General Dynamics/Fort Worth, Tex.
MATERIAL - LOCTITE LIQUID LOCK - EVALUATION OF FOR RECLAMATION OF PARTS HAVING OVERSIZE BEARING SEATS.
Test data memo.,
by J. W. Swain. 2 Nov 62, 4p. incl. tables.
(Rept. no. FTDM-2732)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Liquids, *Sealing compounds, *Bearings, Effectiveness, Seals.

Tests were made to determine if Loctite-A Liquid Lock is satisfactory for repairing gimbal housing assemblies having oversize bearing seats. (Author)

AD-288 562 Div. 14, 20, 13
(TISTM/TCG) OTS price $7.60

General Dynamics/Fort Worth, Tex.
MATERIALS - TANK SEALANTS - IRRADIATION OF TWO FLUXES AND ONE TEMPERATURE - EFFECTS OF.
Test data memo.,
by H. M. Price. 2 Nov 62, 14p. incl. tables.
(Rept. no. FTDM-1904)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Fuel tanks, *Sealing compounds, *Nuclear energy, *Radiation effects, Pressurized cabins, Hardness, Elasticity, Tensile strength, Thermal stresses, Rupture, Corrosion, Extrusion, Aluminum, Sheets, Deterioration, Nuclear propulsion, Aircraft, Neutrons, Gamma rays.

The effects of nuclear radiation at 2 fluxes (10 hr at 100 and 20 hr at 500 Kw) and at 72 to 95F on the hardness, tensile strength, % elongation, peel strength, and thermal rupture properties of four high temperature sealants (EC-1520, -1605, -1612; IE-1240) and one prefabricated fillet material (PR-1422) were determined. (Author)

AD-288 563 Div. 14, 7
(TISTM/TCG) OTS price $1.60

General Dynamics/Fort Worth, Tex.
MATERIAL, POTTING COMPOUND-ELECTRICAL EVALUATION OF,
by R. L. Thomas. 26 Oct 62, 18p. incl. illus. tables (Rept. no. FGT-2179)
(Contracts AF 33(600)36200 and AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Embedding substances, *Sealing compounds, *Polymers, *Urethanes, *Epoxy resins, Electrical properties, Adhesion, Vibration, Moistureproofing, Fuel tanks, Electric connectors, Dielectric properties, Corrosion, Hydraulic fluids, Hardness, Physical properties.

Physical and electrical properties of FMS-0052, Type II, potting compound were determined and included as controls and/or standards of comparison. Four potting compound systems were tested for shrinkage, adhesion, resistance to fuel and hydraulic fluids, hardness, and vibration resistance. (Author)

AD-288 565 Div. 14, 1
(TISTM/EJH) OTS price $1.60

General Dynamics/Fort Worth, Tex.
HYDRAULIC SYSTEM - ORONITE 8515 PRESERVATIVE FLUIDS - EVALUATION OF,
by R. H. McDaniel. 30 Oct 62, 9p. incl. tables, 6 refs. (Rept. no. FGT-2483)
(Contracts AF 33(600)36200 and AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Hydraulic fluids, *Hydraulic systems, Rubber, Seals, Oxidation inhibitors, Corrosion inhibition, Stability, Storage, Additives, Calcium compounds, Sulfonates, Petroleum, Aircraft.

Three formulations of preservative fluids were prepared for testing their suitability for protection and storage of B-58 hydraulic units. Test results indicated that from the standpoint of rubber compatibility and oxidation/corrosion stability, Fluid 53839A-R is the most suitable of the 3 formulations for B-58 hydraulic system use. (Author)

AD-288 566 Div. 14, 17
(TISTM/EJH) OTS price $1.10

General Dynamics/Fort Worth, Tex.
MATERIAL-HIGH TEMPERATURE ADHESIVE-AEROBOND 500-PRELIMINARY EVALUATION OF PROPERTIES.
Test data memo.,
by J. M. Warren. 7 Nov 62, 7p. incl. tables.
(Rept. no. FTDM-1832)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Adhesives, *Bonding, Stainless steel, Shear stresses, Failure (Mechanics), Aging, High temperature research, Sheets.

The lap shear strength of Aerobond-500-bonded 17-7 PH TH-1050 stainless steel specimens was determined and found to be 355 psi lower than the values reported by the manufacturer when tested at 500 F after aging 100 hours at 500 F. (Author)

AD-288 574 Div. 14, 4
(TISTM/EJH) OTS price $1.10

Olin Mathieson Chemical Corp., New Haven, Conn.
B10H12 POLYMERS.
Interim rept.,
by T. L. Heying, 15 Nov 62, 8p. incl. tables, 3 refs. (Technical rept. no. 11)
(Contract Nonr-339500, Proj. 356-431)
Unclassified report

DESCRIPTORS: *Heat resistant polymers, *Decaboranes, *Refractory coatings, *Laminates, *Phosphorus compounds, Polymers, Solvent action, Organic solvents, Coatings, Steel, Aluminum, Additives, Asbestos fiber, Silicon compounds, Dioxides, High temperature research, Stability, Mechanical properties, Nitrogen compounds, Synthesis.

Boron-based polymers stable to 1000 F were prepared:-(OP(Ph)2B10H12(Ph)2P-), (POP-1); (=P(Ph)2CH2CH2(Ph)2P=NP(Ph)2-B10H12(Ph)2PN=), (PNP-I); and (=P(Ph)2-benzo-(Ph)2P=NP(Ph)2B10H12(Ph)2PN=), (PNP-II). Solubility studies indicated that N-methylpyrollidone would be a suitable solvent. All 3 materials evolved H on heating. Evolution of H began at 270 C for POP-I, at 240 C for PNP-I and at 320 C for PNP-II. Continued heating to 350 C showed 4 moles of H per B10H12 unit were evolved. No further gas evolution occurred on prolonged heating at this temperature. Heating to 500 C effected the evolution of a small amount of H and traces of benzene. PNP-II went through a semi-solid state at 320-340 C. Clear, adherent coatings on steel and Al were formed with POP-I. PNP-II laminates with asbestos, carbon and refrasil fillers appeared promising.

AD-288 642 Div. 14, 4
(TISTM/ODN) OTS price $1.10

Stanford Research Inst., Menlo Park, Calif.
ACCELERATED DETERIORATION OF ELASTOMERS.
Quarterly progress rept. no. 1, 1 Aug-1 Nov 62,
by Frank R. Mayo. 9 Nov 62, 7p. incl. illus. 6 refs.
(Contract DA 18-108-cml-7216)
Unclassified report

DESCRIPTORS: *Elastomers, *Polymers, *Rubber, Deterioration, Isoprene, Benzenes, Solutions, Methyl radicals, Cadmium compounds, Oxygen, Films, Oxidation.

A benzene solution of polyisoprene is rapidly degraded by oxygen in the presence of 2,2'-azobis(2-methylpropionitrile), but not in its absence. Cobaltous stearate has little effect on the initial stages of oxidation. Dimethylcadmium causes crosslinking and initiates oxidation of polyisoprene, possibly by acting as a source of methyl radicals. Quantitative comparisons are lacking. (Author)

AD-288 669 Div. 14, 25
(TISTM/BRW) OTS price $2.75

American Cyanamid Co., Bound Brook, N. J.
RESEARCH ON ABSORBING INFRARED RAYS WITH PLASTICS AND ATTENUATING INFRARED RAYS WITH COATINGS.
Final rept., 1 Apr 61-30 Apr 62 on Aerospace Systems Personnel Protection,
by Peter V. Susi and Haig C. Donoian. Aug 62, 94p. incl. illus. tables, 32 refs.
(Contract AF 33(616)8056, Proj. 6301)
(AMRL TDR 62-92)
Unclassified report

DESCRIPTORS: *Infrared research, *Absorption, *Plastics, *Coatings, Attenuation, Plastic coatings, Optical coatings, Infrared filters, Measurement, Light, Stability, Organic coatings, Goggles, Thermal radiation, Fluoborates, Synthesis, Phenyl radicals, Fluorenes, Ammino compounds, Amines, Methanes, Azulenes, Metal-organic compounds, Vinyl radicals, Acrylic resins, Infrared radiation.

With the specific objective of developing a plastic or coating composition having strong near-infrared attenuation and high visible transmittance, a number of organic compounds were prepared and along with many compounds from chemical files were examined spectrophotometrically in solution. Those with near-infrared absorption were incorporated into plastics by one or more of the following methods: solution casting, milling and molding, monomer casting, burnishing, or dyeing. Absorption properties were then measured and light stabilities were determined after accelerated light exposure tests. (Author)

AD-288 682 Div. 14
(TISTM/ODN) OTS price $2.25

Plastics Technical Evaluation Center, Picatinny Arsenal, Dover, N. J.
EFFECTS OF THE SPACE ENVIRONMENT ON PLASTICS: A SUMMARY WITH ANNOTATED BIBLIOGRAPHY,
by Arthur H. Landrock. July 62, 83p. incl. tables (Plastec rept. no. 12)
Unclassified report

DESCRIPTORS: *Bibliography, *Plastics, *Space environmental conditions, Materials, Coatings, Elastomers, Particles, Micrometeorology, Temperature, Erosion, Ultraviolet radiation.

A brief summary outlines the various space environmental factors, natural and induced, and discusses their effects on plastics and related materials. These factors are: UV radiation, high-vacuum environment, temperature extremes, high-energy radiation and high-energy particles, sputtering, and micrometeorite erosion. Structural plastics, coatings, and elastomeric materials are considered. The bibliography lists 202 selected references. In the annotations, plastic materials covered in the references are listed and results and conclusions are outlined when feasible. The arrangement is alphabetical by author. An index in depth is provided, covering both materials and subjects. This index is supplemented with additional indexes listing personal and corporate authors, military contract numbers, ASTIA AD numbers, report numbers, and technical conferences. (Author)

AD-288 719 Div. 14
(TISTM/ODN) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A DEVICE FOR AUTOMATIC CONTROL OF THE CONCENTRATION OF ATOMIZED POWDERED MATERIAL,
by M. I. Abdrakhmanov, G. S. Baturov and others. 19 July 62, 4p. (Trans. no. FTD-TT-62-757 from Soviet Patent No. 140262 (67523/31), 1 Aug 60)
Unclassified report

DESCRIPTORS: *Materials, *Atomization, *Inventions, Potentiometers, Electric motors, USSR, Powders.

AD-288 724 Div. 14
(TISTM/ODN) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE RATE OF DECOMPOSITION (BURNING) OF POLYMERS IN A HIGH-TEMPERATURE GASEOUS MEDIUM,
by Yu. A. Dushin. 18 June 62, 6p. (Trans. no. FTD-TT-62-716 from Inzhenerno-Fizicheskiy Zhurnal, vol. 4, No. 10, pp. 123-126, 1961)
Unclassified report

DESCRIPTORS: *Polymers, *Gases, High temperature research, Styrenes, Ethylenes, Fluorides, Molecular weight, Thermodynamics, Combustion.

AD-288 727 Div. 14, 1
(TISTM/EJH) OTS price $1.10

General Dynamics/Fort Worth, Tex.
MATERIAL - LED-PLATE AND MIL-T-5544 ANTI-SEIZE COMPOUND FOR HIGH TEMPERATURE APPLICATION - EVALUATION OF.
Rept. for 21 Sep-17 Dec 59,
by J. L. Cozart. 7 June 62, 5p. (Rept. no. FTDM-2449)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Antiseize compounds, Coatings, Bolts, Nuts (Mechanics), High temperature research, Aircraft.

AD-288 728 Div. 14, 1
(TISTM/EJH) OTS price $1.10

General Dynamics/Fort Worth, Tex.
MATERIAL - DISILOXANE HIGH TEMPERATURE HYDRAULIC FLUID - MLO 58-361 PRELIMINARY EVALUATION OF,
by R. H. McDaniel. 28 May 62, 4p. (Rept. no. FTDM-2697)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Hydraulic fluids, Hydraulic systems, Rubber seals, Silicones, Hydraulic seals, Stability, Hydrolysis, Water, High temperature research.

AD-288 729 Div. 14
(TISTM/ODN) OTS price $1.60

Imperial Glass Corp., Bellaire, Ohio.
DEVELOPMENT WORK ON IMPROVED HIGH MODULUS STRUCTURAL GLASS FIBER.
Quarterly progress rept. no. 1, 1 Dec 54-28 Feb 55,
by R. R. Bastian and Axel Ottoson. 7 Mar 55, 12p.
(Contract NOa(s) 55-213)
Unclassified report

DESCRIPTORS: *Glass textiles, *Reinforcing materials, Fibers, Glass, Elasticity, Melting.

AD-288 730 Div. 14
(TISTM/ODN) OTS price $2.60

Imperial Glass Corp., Bellaire, Ohio.
DEVELOPMENT WORK ON IMPROVED HIGH MODULUS STRUCTURAL GLASS FIBER.
Quarterly progress rept. no. 2, 1 Mar-31 May 55, by R. R. Bastian, Axel Ottoson, and W. C. Orme. 31 May 55, 22p.
(Contract NOa(s) 55-213)
Unclassified report

DESCRIPTORS: *Glass textiles, *Reinforcing materials, Glass, Melting, Elasticity, Calcium compounds, Aluminates, Fibers.

AD-288 731 Div. 14
(TISTM/ODN) OTS price $1.60

Imperial Glass Corp., Bellaire, Ohio.
DEVELOPMENT WORK ON IMPROVED HIGH MODULUS STRUCTURAL GLASS FIBER.
Quarterly progress rept. no. 3, 1 June-31 Aug 55, by R. R. Bastian, Axel Ottoson, and W. C. Orme. 31 Aug 55, 12p.
(Contract NOa(s) 55-213)
Unclassified report

DESCRIPTORS: *Glass textiles, *Reinforcing materials, Glass, Melting, Elasticity, Calcium compounds, Aluminates, Fibers.

AD-288 732 Div. 14
(TISTM/ODN) OTS price $1.60

Imperial Glass Corp., Bellaire, Ohio.
DEVELOPMENT WORK ON IMPROVED HIGH MODULUS STRUCTURAL GLASS FIBER.
Quarterly progress rept. no. 4, 1 Sep-30 Nov 55, by R. R. Bastian, Axel Ottoson, and W. C. Orme. 30 Nov 55, 16p.
(Contract NOa(s) 55-213)
Unclassified report

DESCRIPTORS: *Glass textiles, *Reinforcing materials, Glass, Melting, Fibers, Elasticity, Tests.

AD-288 733 Div. 14
(TISTM/ODN) OTS price $1.60

Imperial Glass Corp., Bellaire, Ohio.
DEVELOPMENT WORK ON IMPROVED HIGH MODULUS STRUCTURAL GLASS FIBER.
Quarterly progress rept. no. 4, 1 Sep-30 Nov 55, by R. R. Bastian, Axel Ottoson, and W. C. Orme. 30 Nov 55, 15p.
(Contract NOa(s) 55-213)
Unclassified report

DESCRIPTORS: *Glass textiles, *Reinforcing materials, Glass, Melting, Oxides, Fibers.

AD-288 734 Div. 14
(TISTM/ODN) OTS price $1.60

Imperial Glass Corp., Bellaire, Ohio.
DEVELOPMENT WORK ON IMPROVED HIGH MODULUS STRUCTURAL GLASS FIBER.
Quarterly progress rept. no. 5, 1 Dec 55-29 Feb 56,
by R. R. Bastian, Axel Ottoson, and W. C. Orme. 1 Mar 56, 17p.
(Contract NOa(s) 55-213)
Unclassified report

DESCRIPTORS: *Glass textiles, *Reinforcing materials, Glass, Melting, Elasticity, Fibers, Heat treatment.

AD-288 735 Div. 14
(TISTM/ODN) OTS price $1.60

Imperial Glass Corp., Bellaire, Ohio.
DEVELOPMENT WORK ON IMPROVED HIGH MODULUS STRUCTURAL GLASS FIBER.
Quarterly progress rept. no. 6, 1 Mar-31 May 56, by R. R. Bastian, Axel Ottoson, and W. C. Orme. 8 June 56, 16p.
(Contract NOa(s) 55-213)
Unclassified report

DESCRIPTORS: *Glass textiles, *Reinforcing materials, Glass, Melting, Oxides, Heat treatment, Fibers, Elasticity.

AD-288 736 Div. 14
(TISTM/ODN) OTS price $1.10

Imperial Glass Corp., Bellaire, Ohio.
DEVELOPMENT WORK ON IMPROVED HIGH MODULUS STRUCTURAL GLASS FIBER.
Quarterly progress rept. no. 8, 1 Sep-30 Nov 56, by R. R. Bastian and Axel Ottoson. 22 Dec 56, 6p.
(Contract NOa(s) 55-213)
Unclassified report

DESCRIPTORS: *Glass textiles, *Reinforcing materials, Glass, Melting, Beryllium, Heat treatment, Hazards, Handling.

AD-288 737 Div. 14
(TISTM/ODN) OTS price $1.60

Imperial Glass Corp., Bellaire, Ohio.
DEVELOPMENT WORK ON IMPROVED HIGH MODULUS STRUCTURAL GLASS FIBER.
Quarterly progress rept. no. 9, 1 Dec 56-28 Feb 57,
by R. R. Bastian and Axel Ottoson. 29 Mar 57, 16p.
(Contract NOa(s) 55-213)
Unclassified report

DESCRIPTORS: *Glass textiles, *Reinforcing materials, Glass, Melting, Fibers, Physical properties, Electrical equipment.

AD-288 738 Div. 14
(TISTM/ODN) OTS price $1.10

Imperial Glass Corp., Bellaire, Ohio.
DEVELOPMENT WORK ON IMPROVED HIGH MODULUS STRUCTURAL GLASS FIBER.
Quarterly progress rept. no. 10, 1 Mar-30 June 57,
by R. R. Bastian and Axel Ottoson. 23 Aug 57, 6p.
(Contract NOa(s) 55-213)
Unclassified report

DESCRIPTORS: *Glass textiles, *Reinforcing materials, Fibers, Filament-wound construction, Glass, Physical properties, Melting.

AD-288 742 Div. 14, 25, 4
(TISTM/EJH) OTS price $1.10

Textile Research Inst., Princeton, N. J.
EFFECTS OF ANNEALING UPON SHEAR MODULUS AND DENSITY OF LINEAR POLYETHYLENE,
by T. Shibukawa, V. D. Gupta and others. Aug 62, 5p. (Technical rept. no. 28)
(Contracts Nonr-09000 and Nonr-09001)
Unclassified report

DESCRIPTORS: *Polymers, *Ethylenes, Shear stresses, Density, Mechanical properties, Elasticity, Heat treatment, Synthetic fibers.

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AD-288 743 Div. 14, 4
(TISTM/TCG) OTS price $1.60

Textile Research Inst., Princeton, N. J.
TEMPERATURE DEPENDENCE OF MODULUS, DENSITY, AND CRYSTALLINITY OF ISOTACTIC POLYPROPYLENE,
by T. Shibukawa, V. D. Gupta and others. Aug 62, 10p. (Technical rept. no. 29)
(Contracts Nonr-09000 and Nonr-09001)
Unclassified report

DESCRIPTORS: *Polymers, *Propenes, *Fibers, *Textiles, Density, Shear stresses, Crystal structure, Temperature, X-ray diffraction analysis, Physical properties.

AD-288 744 Div. 14, 25, 4
(TISTM/EJH) OTS price $1.10

Textile Research Inst., Princeton, N. J.
TEMPERATURE DEPENDENCE OF MODULUS, AND DENSITY OF NYLON-6,
by T. Shibukawa, V. D. Gupta and others. Aug 62, 5p. (Technical rept. no. 30)
(Contracts Nonr-09000 and Nonr-09001)
Unclassified report

DESCRIPTORS: *Nylon, *Polymers, Shear stresses, Elasticity, Viscosity, Density, Heat treatment, Mechanical properties, Synthetic fibers.

AD-288 747 Div. 14
(TISTM/ODN) OTS price $1.10

Army Prosthetics Research Lab., Walter Reed Army Medical Center, Washington, D. C.
A PROCEDURE FOR CLEANING STAINED PLASTIC FILMS FOR COSMETIC GLOVE MATERIAL EVALUATION,
by James T. Hill. Feb 62, 4p. (Technical rept. no. 6202)
(Proj. 6X59-01-001-04)
Unclassified report

DESCRIPTORS: *Plastics, Gloves, Materials, Films, Acrylic resins, Vinyl radicals, Cleaning fluids, Cleaning.

AD-288 748 Div. 14
(TISTM/ODN) OTS price $1.10

Army Prosthetics Research Lab., Walter Reed Army Medical Center, Washington, D. C.
PHYSICAL EVALUATION OF 62.5/35/2.5 BA/MMA/MAD ELASTOMER.
Rept. for 6 Dec 61-12 Mar 62,
by Joshua Nelson. Mar 62, 10p. (Technical rept. no. 6208)
(Proj. 6X59-01-001-04)
Unclassified report

DESCRIPTORS: *Elastomers, *Acrylic resins, *Amides, Polymers, Physical properties, Polymerization.

AD-288 749 Div. 14
(TISTM/TCG) OTS price $1.10

Aerospace Information Div., Washington, D. C.
MECHANICAL TESTS OF PLASTICS.
11 June 62, 4p. (AID rept. no. 62-77)
Unclassified report

DESCRIPTORS: *Plastics, Deformation, Elasticity, Stresses, Physical properties, Test methods, Creep, Fracture (Mechanics), Mechanical properties.

AD-288 753 Div. 14
(TISTM/ODN) OTS price $1.10

Aerospace Information Div., Washington, D. C.
TESTING METHODS FOR PLASTICS; WORKING CONFERENCE.
6 July 62, 5p. (AID rept. no. 62-96; Trans. from Plasticheskiye massy, nos. 3, 4, and 12, pp. 1-2, 70, 77, 1961-1962)
Unclassified report

DESCRIPTORS: *Plastics, USSR, Mechanical properties, Processing, Chemical properties, Physical properties, Chemical analysis, Dielectric properties, Test methods.

AD-288 754 Div. 14, 25
(TISTM/TCG) OTS price $1.10

Aerospace Information Div., Washington, D. C.
TESTING OF POLYMERS BY THE METHOD OF THERMO-MECHANICAL CURVES.
17 July 62, 4p. refs. (AID rept. no. 62-106)
Unclassified report

DESCRIPTORS: *Polymers, *Mechanics, Elasticity, Deformation, Plasticity, Glass, Transition temperature, Test methods, Thermodynamics, Mechanical properties.

AD-288 755 Div. 14
(TISTM/ODN) OTS price $1.60

Forest Products Lab., Madison, Wis.
TIRE-TUBE METHOD OF FENCE POST TREATMENT.
Rev. May 62, 16p. (Rept. no. 1158, rev.)
Unclassified report

DESCRIPTORS: *Wood, *Preservation, Zinc compounds, Chlorides, Deterioration, Postholes, Rubber.

AD-288 756 Div. 14
(TISTM/ODN) OTS price $8.10

Forest Products Lab., Madison, Wis.
SHEAR STABILITY OF FLAT PANELS OF SANDWICH CONSTRUCTION,
by Edward W. Kuenzi, W. S. Ericksen, and John J. Zahn. rev. May 62, 63p. illus. tables (Rept. no. 1560, rev.)
Unclassified report

DESCRIPTORS: *Sandwich panels, *Sandwich construction, Theory, Mathematical analysis, Shear stresses, Stability, Buckling, Tests, Materials.

AD-288 757 Div. 14
(TISTM/ODN) OTS price $1.60

Forest Products Lab., Madison, Wis.
YIELD IN CLEAR CUTTINGS FROM STANDARD GRADE EASTERN WHITE PINE BOARDS IN NEW ENGLAND,
by George H. Englerth and A. C. Wollin. May 62, 7p. tables (Rept. no. 2243)
Unclassified report

DESCRIPTORS: *Wood, *Materials, Trees, Quality control, Sawmills.

AD-288 758 Div. 14
(TISTM/ODN) OTS price $2.60

Forest Products Lab., Madison, Wis.
EFFECT OF REPEATED LOADING AND SALT-WATER IMMERSION ON THE FLEXURAL PROPERTIES OF GLUED-LAMI-

NATED MEMBERS (COAST-TYPE DOUGLAS-FIR).
Final rept.,
by Fred Werren. Aug 62, 12p. tables (Rept. no. BuS-17)
Unclassified report

DESCRIPTORS: *Wood, *Laminates, *Beams, Sea water, Tests, Mechanical properties.

AD-288 761 Div. 14
(TISTM/TCG) OTS price $2.60

Institute of Paper Chemistry, Appleton, Wis.
DEVELOPMENT OF AN IMPROVED DIFFUSION BOARD MATERIAL.
Monthly rept. no. 19, 29 Apr-28 May 62.
27 July 62, 26p.
(Contracts DA 18-108-405-cml-941 and DA 18-108-cml-6561, Proj. 2256)
Unclassified report

DESCRIPTORS: *Wood pulp, *Fiberboard, *Plywood, Diffusion, Carbon dioxide, Water, Absorption, Beams, Tensile properties, Preparation.

AD-288 782 Div. 14
(TISTM/TCG) OTS price $1.10

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
EVALUATION OF PLASTIC ROPE HANDLES FOR AMMUNITION PACKING BOXES,
by Roswell H. Evans and Michael Papp. July 62, 12p. (Picatinny Arsenal Technical memo. no. 1014)
Unclassified report

DESCRIPTORS: *Plastics, *Cordage, *Polymers, *Ethylenes, *Propenes, Ammunition, Containers, Moistureproofing, Physical properties.

AD-288 797 Div. 14, 17
(TISTM/EJH) OTS price $5.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
COATING STUDIES AT KWAJALEIN, KANEOHE, AND PORT HUENEME,
by C. V. Brouillette and R. L. Alumbaugh.
2 July 62, 57p. (Technical rept. no. R-197)
(Proj. no. Y-R007-08-001)
Unclassified report

DESCRIPTORS: *Steel, *Corrosion inhibition, *Weatherproofing, *Coatings, Climatic factors, Sea water, Zinc coatings, Chromates, Asphalt, Mica.

AD-288 813 Div. 14, 27
(TISTM/EJH) OTS price $8.10

Naval Ordnance Lab., White Oak, Md.
THE PERFORMANCE OF SELECTED PLASTICS MATERIALS IN A HIGH TEMPERATURE ENVIRONMENT,
by Aaron Fisher, M. A. Kinna and others.
1 Mar 62, 1v. incl. illus. tables, 7 refs.
(NAVWEPS-7390) Unclassified report

DESCRIPTORS: *Thermal insulation, *Rocket motors, *Refractory materials, *Heat resistant polymers, *Composite materials, *Laminates, Plastics, Elastomers, Phenolic resins, Glass textiles, Graphite, Zirconium compounds, Oxides, Nylon, Test methods, Pyrolysis, Erosion, Ablation, Infrared radiation, Reflection, Foils, Materials.

A variety of plastics materials were studied under neutral oxy-acetylene flame test conditions. Most refractory fillers added to phenolic resins did not improve erosion and insulation characteristics. A single exception was zirconia which gave a marked improvement in erosion rate. Plastics matrices which develop no effective refractory or protective shield in themselves were not improved by the addition of superrefractories. The behavior of the plastic matrices during exposure to flame is extremely important. Plastics which develop a stable char structure, usually cellular, give improved performance as thermal insulators. Basic elastomeric materials, normally exhibiting poor performance, may be made useful in high temperature applications if compositionally designed to develop both cellularity and heat barrier shielding. The use of infrared reflective barriers, such as tantalum foil and potassium titanate did not prove effective. Thermal performance data are presented on materials and guides are provided for their selection in terms of erosion rate, time of temperature rise to 200 C on the cold side, and index of performance. (Author)

AD-288 814 Div. 14, 4
(TISTM/ODN) OTS price $3.60

Naval Ordnance Lab., White Oak, Md.
THE POLYMERIZATION OF ROOM TEMPERATURE CURING EPOXY RESINS,
by Doris V. Steele. 4 Jan 62, 1v. incl. illus. tables, 16 refs. (Rept. no. NOLTR 62-1)
Unclassified report

DESCRIPTORS: *Epoxy resins, *Polymerization, *Resins, Chemical bonds, Storage, Monitors, Polymers, Structures, Volume, Test methods, Temperature, Embedding substances, Electrical effects, Aging, Resistance.

The effect of resin mass on degree of crosslinking during initial polymerization of three typical inert filled epoxy resin compounds was determined by electrical resistivity techniques. The extent of crosslinking during 16 months storage was determined to find out if and when polymerization was completed and stability of the polymer structure was obtained. Test data show that large masses of a resin will exhibit higher crosslinking if accelerated by an exothermic reaction during the initial polymerization period. In systems which do not exhibit an exothermic reaction, the rate of polymerization is slow and is not affected by resin mass. Continued polymerizations at slow rates were monitored for periods of time ranging from three days to over 16 months before polymerization was completed. The degree of crosslinking in the final three-dimensional network of such thermoset polymers was shown to be dependent on the extent of crosslinking during the initial polymerization process. The principal test equipment employed was the continuous current monitoring device. Electrical volume resistivity data were obtained and activation energies for the electrical conduction process were calculated and used as an index of the extent of polymerization and crosslinking within the polymer structure. (Author)

AD-288 843 Div. 14, 26
(TISTM/BRW) OTS price $1.60

Shell Development Co., Emeryville, Calif.
FUNDAMENTALS OF HIGH TEMPERATURE BEARING LUBRICATION.

Bimonthly rept. no. 5, Aug-Sep 62,
by J. B. Accinelli and S. J. Beaubien. Sep 62,
6p. illus. table (Rept. no. S-1386S)
(Contract NOw 62-0239-c)
Unclassified report

Original contains color plates; all ASTIA reproductions will be in black and white. Original may be seen in ASTIA Hq.

DESCRIPTORS: *Bearings, *Lubrication, *Ball bearings, *Lubricants, High temperature research, Friction, Mineral oils, Tests, Temperature, Test equipment, Deposits.

This report presents studies in the 25 mm rig on the separate effects on the friction-limited temperature of increased lubricant flow into the bearing, and of greatly reducing bearing speed. Reported also is the first completely successful series of experiments on the 35 mm rig in which bearing friction torque is related to speed, load and lubricant flow rate at a constant temperature of 600 F. Increasing lubricant flow into the bearing by a factor of two (140 g/min) did not increase the friction limited temperature (FLT) of a light viscosity (17 cs at 100 F) highly refined mineral oil operating in a 25 mm M50-M0 ball bearing at 60,000 rpm and 200 lb thrust load. Reducing speed from 60,000 to 10,000 rpm did not increase the FLT of the M50-M0 ball bearing lubricated with a highly refined mineral oil of 76 cs at 100 F viscosity. Friction torque of a 35 mm M10-M0 ball bearing increases with speed, load and flow rate. However, at very high speeds (40,000 and 50,000 rpm) and high load (400 lbs thrust) a low lubricant flow rate (50 g/min) results in serious bearing distress and very high friction torque. (Author)

AD-288 853 Div. 14, 1
(TISTM/EJH) OTS price $2.60

General Dynamics/Fort Worth, Tex.
MATERIAL - ACCESS DOOR SEALANT - EVALUATION OF,
by M. T. Carroll. 26 Aug 57, 22p. incl. tables.
(Rept. no. FTDM-1720)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Sealing compounds, Fuselages, Aircraft, Fuel tanks, Airframes, Military requirements, Specifications, High temperature research, Pressurized cabins.

As a result of tests based on specification FMS-0008 and MIL-S-8802, EC-1520 was selected for use on the B-58. An access door sealing specification (FMS-0005) was prepared. (Author)

AD-288 854 Div. 14, 1
(TISTM/EJH) OTS price $5.60

General Dynamics/Fort Worth, Tex.
MATERIAL - COMPOUND AERODYNAMIC SMOOTHER - FLEXIBLE TYPE - EVALUATION OF,
by A. W. Gover. 6 Aug 57, 1v. incl. illus. tables (Rept. no. FTDM-1707; This rept. includes amend. no. 1 to Rept. no. FMS-0047, AD-126 025)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Sealing compounds, Fuselages, Aircraft, Airframes, Rubber, Epoxy resins, Aluminum, Fuel tanks, Pressurized cabins, High temperature research, Specifications.

Four flexible type smoothers were tested for their ability to withstand expected B-58 environmental conditions. Of the four (A-2, A-3, EC1604, and EC1451), EC1451 was considered the most suitable. Specification FMS-0008 covering high temperature resistant rubber sealing compounds for fuel tanks and pressurized enclosures and Specification FMS-0047 covering aerodynamic smoothing compounds are included.

AD-288 856 Div. 14, 27, 1
(TISTM/EJH) OTS price $2.60

General Dynamics/Fort Worth, Tex.
FUSELAGE - BONDED ALUMINUM SANDWICH - EDGE MEMBER SEALING SYSTEM AND STRUCTURAL EVALUATION,
by J. W. Swain. 14 Dec 60, 21p. incl. illus. tables (Rept. no. FTDM-2752; This rept. includes rept. no. FZM-4-355-A, AD-103 129)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Sandwich panels, *Aluminum, *Airplane panels, Aircraft, Fuels, Jet engine fuels, Laminates, Resin adhesives, Silicones, Rubber, Bonding, Glass textiles, Composite materials.

Fuel tightness of bonded aluminum sandwich panels with various glass reinforced plastic edge member configurations was determined under cyclic loading conditions and varying temperatures. SMR-7 silicone rubber bonded to Conolon 506 laminate using Dow Corning A-4094 primer, aluminum foil bonded with Narmco 406 adhesive on top of Conolon 506 laminate, and Narmco 406 outer layer on Conolon 533 laminate are considered satisfactory edge member configurations. (Auuhor)

AD-288 860 Div. 14, 13
(TISTM/TCG) OTS price $5.60

General Dynamics/Fort Worth, Tex.
MATERIAL: SEALANT TOP COAT - DETERMINE NEED FOR,
by M. T. Carroll. 21 Feb 61, 1v. incl. illus. tables (Rept. no. FTDM-2803; This rept. includes amend. no. 1 to rept. no. FMS-0005, AD-121 633 and rept. no. FMS-0008-B, AD-132 124)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Sealing compounds, *Fuel tanks, *Coatings, *Pressurized cabins, Metals, Alloys, Sheets, Aluminum alloys, Stainless steel, Titanium alloys, Fuels, Thermal stresses, Tensile strength, Elasticity, Corrosion, Deformation, Buckling, Heating, Rupture, Low temperature research, Chemical reaction, Fuel seals.

Tests were conducted to determine if B-58 fuel tank sealants possess adequate fuel resistance without the use of MIL-S-4383(B) top coat sealant (EC-776). This top coat sealant appears to be detrimental to the sealants when they are exposed to heat following fuel immersion. This condition is clearly seen by a comparison of the tensile strength and elongation values of the materials tested. The elongation of all materials top coated with EC-776 is much less than those without a top coat. Weight loss test results indicated that EC-776 affords some protection against fuel extraction of the sealants. (Author)

AD-288 862 Div. 14, 26
(TISTM/TCG) OTS price $.75

Alloyd Corp., Cambridge, Mass.
ALL-PURPOSE PLATING APPARATUS FOR RESEARCH ON VAPOR PHASE COATINGS.

Final rept., June 61-May 62 on Finishes and Materials Preservation,
by Iwan Marinow, Charles A. Gellar, and Robert Bakish. Sep 62, 23p. incl. illus. table, 7 refs.
(Contract AF 33(616)8337, Proj. 7312)
(ASD TDR 62-499) Unclassified report

DESCRIPTORS: *Vapor plating, *Metals, *Ceramic materials, *Laboratory equipment, *Coatings, Butyl radicals, Aluminum, Molybdenum compounds, Carbonyl radicals, Tungsten compounds, Iron compounds, Vaporization, Decomposition, Deposits, Temperature, Vacuum systems, Metal coatings, Molybdenum plating, Plating, Vaporization.

An apparatus was developed to perform experimental vapor phase coating. It is capable of plating many of the metals and ceramic materials now deposited by the vapor phase process, and, more importantly, is capable of producing alloys and composite materials. The apparatus obtains the closest possible physical control of the deposition conditions, while emphasizing versatility and ease and simplicity of operation, so as to become an excellent vehicle for the evaluation of both plating compounds and deposited coatings. A variety of coating tasks was also undertaken to demonstrate the flexibility of this apparatus. The necessary laboratory facilities and support equipment to operate, maintain, and service the apparatus, and also to conduct pre-deposition bench testing of potential plating compounds, were also included in the program. (Author)

AD-288 875 Div. 14, 29
(TISTM/ODN) OTS price $1.10

Army Prosthetics Research Lab., Walter Reed Army Medical Center, Washington, D. C.
EFFECT OF INCREASED RESIN CONTENT IN COSMETIC GLOVE PLASTISOL NXEP.
Rept. for Oct-Nov 62,
by James G. Eaton, Jr. Nov 62, 8p. incl. illus. tables, 7 refs. (Technical rept. no. 6223)
(Proj. 6X59-01-001-04)
Unclassified report

DESCRIPTORS: *Gloves, *Resins, *Plastics, *Prosthetics, Vinyl radicals, Materials, Films, Tensile properties, Elasticity, Temperature, Tests, Polymers.

An increase in the resin content of an experimental vinyl cosmetic glove plastisol is shown to have the effect of improving strength and strain resistance of the cured glove material. (Author)

AD-288 936 Div. 14, 21, 1
(TISTM/EJH) OTS price $6.60

General Dynamics/Fort Worth, Tex.
MATERIAL-EFFECTS OF NUCLEAR RADIATION ON CERTAIN FUEL TANK SEALANTS AND PRESSURE SEALANTS.
Test data memo.,
by H. M. Price. 2 Nov 62, 28p. incl. illus. tables (Rept. no. FTDM-2505)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Sealing compounds, Mechanical properties, Radiation effects, Physical properties, Fuel tanks, Nuclear propulsion, Aircraft, Fuselages, Specifications.

Studies were made to determine effects of nuclear radiation at ambient reactor temperature (without fuel immersion and during fuel immersion) upon specific physical properties of 3 sealing compounds, (EC 1610, EC-1520, PR-1422), and 7 other materials. The greatest change in physical properties occurred during irradiation at flux 2 (3000 kw, 20 hrs. Of the fuel tank sealants, EC-1520 appeared the least affected by nuclear radiation. Of the other materials, a carbon black material appeared to be the least affected by radiation.

AD-288 937 Div. 14, 1
(TISTM/EJH) OTS price $1.10

General Dynamics/Fort Worth, Tex.
WING-SANDWICH PANEL-EC-1610 PRESSURE INJECTION FUEL SEALING-TESTING OF.
Test data memo.,
by M. T. Carroll. 2 Nov 62, 5p. incl. illus.
(Rept. no. FTDM-2231)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Sandwich panels, *Airplane panels, *Seals, *Fuel seals, Fuel tanks, Extrusion, Wings, Jet engine fuels, High temperature research.

A new method of sealing integral fuel tanks was proposed. This method proposes that only one material be used to seal the external grooves, thus eliminating the prefabricated fillets and aerodynamic smoother. A mandatory property of the material selected is that it shall not extrude above the surface of the external skin at high temperatures. Two materials which show promise in this application are EC-1610 and EC-1610 (gray) sealants. These materials were evaluated in a small simulated wing tank to determine their sealing characteristics. Conclusion: EC-1610 and EC-1610 (gray) do not provide a seal equivalent to the seal presently used in B-58 production because of extrusion at high temperature. (Author)

AD-288 943 Div. 14
(TISTM/BRW) OTS price $1.60

National Carbon Co., Parma, Ohio.
RESEARCH AND DEVELOPMENT ON ADVANCED GRAPHITE MATERIALS. VOLUME VIII. ELECTRON SPIN RESONANCE IN POLYCRYSTALLINE GRAPHITE.
Report on Refractory Inorganic Non-Metallic Materials,
by L. S. Singer and G. Wagoner. June 62, 13p. incl. illus. 22 refs.
(Contract AF 33(616)6915, Proj. nos. 7350, 7381 and 7-817)
(WADD TR 61-72, vol. 8) Unclassified report

DESCRIPTORS: *Graphite, *Paramagnetic resonance, *Carbon black, Conductors, Crystal structure, Measurement, Heating, Microwaves, Impurities.

The electron spin resonance of polycrystalline graphite is shown to be due to charge carriers, as for single crystals. For lampblack-base graphite, the variation in g-value with temperature agrees approximately with that for single crystal graphite if it is assumed that the spins effectively average out the anisotropic interactions by rapid intercrystallite diffusion. The magnitude and temperature dependence of the spin susceptibility are found to be in excellent agreement with McClure's theoretical predictions for the charge carriers in perfect graphite. Complications of measuring these materials are discussed, including effects of skin depth and microwave heating and the dependence upon crystallite size and sample purity. It is found that two types of impurities can affect the resonance;

those which become ionized and shift the Fermi level, and large un-ionized atoms which do not shift the Fermi level but act as efficient scattering centers for shortening the spin-lattice relaxation time. (Author)

AD-288 944 Div. 14
(TISTM/BRW) OTS price $1.75

Narmco Industries Inc., San Diego, Calif.
DETERMINATION OF THE PERFORMANCE OF PLASTIC LAMINATES UNDER CRYOGENIC TEMPERATURES.
Final rept. 1 May 61-31 July 62 on Materials Application,
by Norman O. Brink. Aug 62, 64p. incl. illus. tables.
(Contract AF 33(616)8289, Proj. 7381)
(ASD-TDR 62-794) Unclassified report

DESCRIPTORS: *Laminates, *Plastics, Epoxy resins, Phenolic resins, Esters, Polymers, Heat resistant polymers, Silicone resins, Low temperature research, Tests, Temperature, Mechanical properties, Cryogenics.

The main objective of this program was to determine the performance of various reinforced plastic laminates at different cryogenic temperatures. Ten materials were evaluated, and represented the epoxy, phenolic, polyester, high temperature polyester, and silicone resin systems. The materials were tested in tension, compression, flexure, and tensile fatigue. Test temperatures included room, -110 F (dry ice and alcohol), -320 F (liquid nitrogen), and -424 F (liquid hydrogen). Results of this program have shown that the reinforced plastic materials generally increase in strength as the temperature decreases. The laminates maintained the same relative tensile fatigue resistance at the cryogenic temperatures tested when compared to the room temperature results. (Author)

AD-288 953 Div. 14
(TISTM/TCG) OTS price $1.10

Material Lab., New York Naval Shipyard, Brooklyn.
HYDRAULIC FLUIDS, FIRE RESISTANT SYNTHETIC PHOSPHATE ESTER; RUST INHIBITION OF; RADIOISOTOPE TRACER STUDY OF.
Progress rept. no. 3.
1962, 9p. (Lab. proj. no. 5319-42)
Unclassified report

DESCRIPTORS: *Hydraulic fluids, *Phosphates, *Esters, *Corrosion inhibition, Adsorption, Steel, Borates, Colloids, Synthesis, Additives.

AD-288 996 Div. 14
(TISTM/TCG) OTS price $1.60

Quartermaster Research and Engineering Command, Natick, Mass.
THE EFFECT OF SAMPLE WEIGHT ON THE HEAT TRANSFER AND IGNITION CHARACTERISTICS OF A SERIES OF 60/40 COTTON/NYLON BLENDS,
by E. T. Waldron. Nov 61, 8p. (Textile Functional Finishes rept. no. 196)
(Proj. 7-12-01-002)
Unclassified report

DESCRIPTORS: *Cotton mats, *Nylon, *Ignition, *Heat transfer, Deterioration, Physical properties, Optical analysis, Paper, Textiles.

AD-289 002 Div. 14, 20
(TISTM/BRW) OTS price $2.75

Oak Ridge Technical Enterprises Corp., Tenn.
EFFECTS OF LONG TERM VACUUM ON COMMERCIAL SILICON RADIATION DETECTORS.
Final technical documentary rept., 1 Oct 61-24 May 62 on Research on Solid State Detectors,
by W. L. Weiss and E. M. Whatley. Aug 62, 137p. incl. illus. tables, 43 refs.
(Contract AF 33(616)8397, Proj. 7112)
(ARL 62-416) Unclassified report

DESCRIPTORS: *Semiconductors, *Detectors, *Silicon, Electron bombardment, Single crystals, Crystal structure, Electrical conductance, Electric potential, Diodes, Storage, Life expectancy, Radiation damage, Radiation effects, Fast neutrons, Low pressure research.

The data presented in this report are graphical representations describing the effects of long term vacuum (about 10 to the -6th power mm Hg for 6 months) on commercially available silicon radiation detectors of two types: surface barrier, which is manufactured from p-type single crystal silicon. Data include measurements of alpha resolution, dead layer or window thickness, RMS noise voltage, reverse leakage current and pulse height stability at rated voltage. In addition, the report includes a summary of radiation damage on semiconductor materials and devices. (Author)

AD-289 030 Div. 14, 1
(TISTM/TCG) OTS price $1.60

General Dynamics/Fort Worth, Tex.
MATERIAL - INTEGRAL FUEL TANK SEALANT - NEW HIGH TEMPERATURE RESISTANT (275F) EXTERNAL GROOVE TYPE - SCREENING TEST OF,
by H. M. Price. 19 May 60, 11p. incl. illus. table (Rept. no. FTDM-2536)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Sealing compounds, *Fuel tanks, Thermal diffusion, Seals, Silicones, Epoxy resins, Polymers, Urethanes, Sulfides, Aluminum compounds, Wings, Fuselages, Jigs, Physical properties.

The thermal extrusion properties of nine sealants in simulated wing and fuselage groove jigs were investigated. Test specimens included polyurethane, silicone, epoxy resins, and polysulfide compositions. (Author)

AD-289 070 Div. 14
(TISTM/ODN) OTS price $1.10

General Dynamics/Fort Worth, Tex.
MATERIAL - ADHESIVE - FMS-0016 (PLASTILOCK 620-626) LAP SHEAR SPECIMENS OF - ADHESIVE ALLOWABLES ON - TESTS FOR.
Test data memo.,
by J. E. Thomas. 14 Aug 58, 9p. incl. illus. tables (Rept. no. FTDM-1967)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Adhesives, Bonding, Loading, Metals, Aluminum, Tests, Failure (Mechanics), Specifications, Processing.

The effect of interrupted rates of load application on the bond strength of FMS-0016 adhesive (Plastilock 620-626) at 260 F for single and double overlap shear bonded specimens was determined. Preparation, bonding and test procedures for ten lap shear panels are described. The bond strength at 260 F of FMS-0016 (Plastilock-620-626) adhesive bonded specimens of 0.50 in. single overlap is lowered by interrupting the loading at 90% of the ultimate strength and sustaining a constant load for periods of time at 260 F. Specimens of 1.00 in. double overlaps are not affected by similar conditions. (Author)

Division 14 - MATERIALS (NON-METALLIC)

AD-289 071 Div. 14, 17
(TISTM/ODN) OTS price $1.10

General Dynamics/Fort Worth, Tex.
MATERIAL - ADHESIVE AF-31 - BONDING 2020T6 ALUMINUM ALLOY - LAP SHEAR STRENGTH DEVELOPED - DETERMINATION OF.
Test data memo.,
by L. E. Weltman. 6 Feb 58, 3p. incl. table
(Rept. no. FTDM-1850)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Adhesives, Bonding, Alloys, Aluminum alloys, Processing, Heat resistant alloys, Low temperature research, Stresses, Failure (Mechanics), Shear stresses, Tests.

Lap shear strength developed at -67 F, room temperature, and 260 F on FPS-0003-cleaned 2020 T6 Al alloy bonded with AF-31 adhesive was determined. Average lap shear strengths of 2024T3 clad aluminum bonded with AF-31 are 3780 psi at room temperature, 2460 psi at -67 F, and 2210 psi at 260 F. Except for one result at -67 F, the 2020T6 results are somewhat higher than those obtained with 2024 clad alloy. Since 2020T6 is a high-temperature-resistant alloy, it is of significance that lap shear results at 260 F are 15% above those obtained on 2024. (Author)

AD-289 072 Div. 14, 17
(TISTM/ODN) OTS price $1.60

General Dynamics/Fort Worth, Tex.
MATERIAL - ADHESIVE PRIMER - METAL-TO-METAL - PLASTILOCK 650 - EVALUATION OF.
Test data memo.
by R. L. Miller. 18 Oct 57, 10p. incl. tables
(Rept. no FTDM-1747)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Adhesives, Metals, Films, Sea water, Sprays, Tests, Alloys, Aluminum alloys, Shear stresses, Failure (Mechanics), Bonding.

The effects of Plastilock 650 primer on the shear strength properties of Plastilock 650 film adhesive at -67 F, 75 f, and 260 F and its effect on salt spray resistance were determined. Lap shear specimens prepared, using 2024 T3 Alclad aluminum alloy, show that the primer increases the shear strength of the film adhesive at these temperatures and increases resistance to the 30-day salt spray tests. (Author)

AD-289 073 Div. 14
(TISTM/EJH) OTS price $1.60

General Dynamics/Fort Worth, Tex.
MATERIAL - ADHESIVE - HEXCEL HP422 - VOLATILE BY PRODUCTS - DETERMINATION OF,
by L. E. Weltman and J. R. Hooker. 4 Sep 57, 10p. incl. illus. tables (Rept. no. FGT-1717)
(Contracts AF 33(600)32841 and AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Adhesives, *Adhesive tapes, Bonding, Heating, Vapors, Vaporization, Water, Phenols, Ammonia, Formaldehyde.

Volatile products given off by HP422 adhesive during bonding were determined as a function of time and temperature. The composition of the volatile products was found to be 91.9% water, 6.8% phenol, 1.3% ammonia and a trace of formaldehyde. The flow values for the adhesive which were also determined, have no relationship to volatile material given off during the heating cycle. (Author)

AD-289 074 Div. 14, 27, 12
(TISTM/EJH) OTS price $1.60

General Dynamics/Fort Worth, Tex.
ENGINEERING RESEARCH - SEALING - METAL-FIBER COMPOSITE - EVALUATION OF,
by M. T. Carroll and D. J. Pritchard. 30 Dec 61, 16p. incl. illus. table (Rept. no. ERR-FW-121)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Seals, *Fuel seals, *Fuel tanks, Composite materials, Silver, Impregnation, Silver plating, Pressure, Failure (Mechanics), Re-entry vehicles.

A silver impregnated metal-fiber composite seal was received for testing as a fuel seal in the temperature range of -100 F to +1200 F. The seal was a flat circular gasket 8 1/4 in. in diameter and .031 in. thick. Sealing properties at room temperature were determined by installing the seal between the faying surfaces of a steel test tank and applying internal pressures from 5 to 30 psi. An air tight seal at room temperature could not be obtained with this composite fiber-metal seal. (Author)

AD-289 075 Div. 14
(TISTM/BRW) OTS price $1.60

General Dynamics/ Fort Worth, Tex.
MATERIAL - ADHESIVE - SHELL 422J (9-13 MIL. THICKNESS) - MIL-A-5090B FLUID IMMERSION TESTS, BEND TESTS AND CREEP RUPTURE TEST OF.
Test data memo.
by J. A. Arnold. 11 Jan 57, 15p. incl. tables.
(Rept. no. FTDM-1610)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Adhesives, *Metals, Bonded joints, Creep, Rupture, Deformation, Fluids, Aluminum alloys, Sheets, Stresses, Bonding.

Shell 422J (9-13 mil. thickness) adhesive satisfactorily meets the requirements for creep rupture and total deformation and bend tests described in Convair Specification FMS-0015(C) and fluid immersion tests as described in MIL-A-5090B. (Author)

AD-289 076 Div. 14
(TISTM/BRW) OTS price $1.10

General Dynamics/Fort Worth, Tex.
MATERIAL - ADHESIVES - FMS-0057 AND FMS-0016-PEEL STRENGTHS TO CLAD AND UNCLAD 2020 ALUMINUM ALLOYS.
Test data memo.,
by R. L. Miller. 16 Feb 59, 5p. incl. tables.
(Rept. no. FTDM-2182)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Adhesives, *Metals, Bonded joints, Shear stresses, Aluminum alloys, Sheets, Bonding.

When bonded and tested as outlined in this report, the peel strength of FMS-0016 adhesive was about four times greater than that of FMS-0057 adhesive. There was no significant difference between the peel strengths of individual specimens of 2020T-6 clad, 2020T-6 unclad, and 2024T-86 clad aluminum alloys when bonded with FMS-0057 adhesive, or with FMS-0016 adhesive.

AD-289 077 Div. 14
(TISTE/OHD) OTS price $1.10

General Dynamics/Fort Worth, Tex.
MATERIAL - ADHESIVE - SILICONE RUBBER - SILASTIC S2200 - EVALUATION OF.
Test data memo.,
by J. W. Swain. 9 Apr 58, 3p. incl. tables.
(Rept. no. FTDM-1901)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Adhesives, *Rubber adhesives, Silicones, Test methods, Stresses, Experimental data.

The peel strength was determined for Silastic S2200 adhesive when used to bond silicone rubber to itself and to various aircraft materials. (Author)

AD-289 079 Div. 14
(TISTM/ODN) OTS price $1.10

General Dynamics/ Fort Worth, Tex.
MATERIALS - STRENGTH AT -68F - AF-31 LAP SHEAR - EFFECT OF SPECIMEN ECCENTRICITY.
Test data memo.,
by J. May. 13 Mar 59, 7p. incl. illus. table.
(Rept. no. FTDM-2150)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Adhesives, Shear stresses, Bonding, Failure(Mechanics), Aluminum, Tests, Loading, Low temperature research.

The shear strength of AF-31 adhesive at -68 F for specimens having minimum eccentricity and several overlap thickness ratios at each extreme of the AF-31 bond cycle was determined. Since single overlap shear specimens do not simulate actual structural requirements because of eccentricity and resulting adhesive peel, it was necessary to determine the shear stress of the adhesive using specimens with minimum eccentricity. Fourteen double lap shear specimens from pads 2, 4, and 5, failed in 3 or 4 places instead of 2. In these cases, the bond failure area was computed using the sum of the least two bond lengths where failure could occur. This gave the highest unit stress and was probably the area of primary failure. (Author)

AD-289 080 Div. 14, 1
(TISTM/EJH) OTS price $3.60

General Dynamics/Fort Worth, Tex.
MATERIALS - STRUCTURAL ADHESIVES - EVALUATION OF COMPATIBLE CURING CYCLES,
by J. P. Thomas. 28 Feb 58, 1v. incl. illus. tables (Rept. no. FGT-1883)
(Contracts AF 33(600)32841 and AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Adhesives, *Airplane panels, Sandwich panels, Honeycomb cores, Aluminum, Bonding, Processing, Heat treatment.

Lap shear specimens fabricated with AF-31 and Plastilock 650 (FMS-0057 Adhesives) and pi-tension specimens fabricated with Aerobond 422 (FMS-0015 Adhesives) were bonded at various dwell cycles and tested at room temperature, 260 F and -67 F to determine a compatible cure cycle for both FMS-0057 and FMS-0015 adhesives. The 180 F dwell cycle is satisfactory for both FMS-0057 and FMS-0015 adhesives. On the other hand, flow tests confirm previous findings that Aerobond 422 flows best at 240 F dwell. Consequently a possible cure cycle without a dwell and with a gradual heat rise to the cure temperature of 350 F would be better from a production standpoint. (Author)

AD-289 208 Div. 14, 26
(TISTM/EJH) OTS price $3.60

Solar, San Diego, Calif.
EXPLORATION AND EVALUATION OF NEW GLASSES IN FIBER FORM.
Bi-monthly progress rept. no. 5, 16 July-15 Sep 62,
by Gunther K. Schmitz, John A. Bauer, and Robert M. Gardner. 25 Oct 62, 29p. illus. 5 refs. (Rept. no. RDR 1266-6; Technical memo. no. 200)
(Contract Nonr-365400)
Unclassified report

DESCRIPTORS: *Glass textiles, *Ceramic fibers, *Glass, *Drawing (Machine processing), Fibers, Synthetic fibers, Failure (Mechanics), Tensile properties, Mechanical properties, Test methods, Mathematical analysis.

Drawing of E-glass fibers for length effect study has commenced. Fibers from 994 glass composition were drawn tentatively for the same purpose. Short fiber tensile tests on fibers from S-994 strand showed considerable data scatter in contrast to previous X-994 results. Strength data fell within the strength-length envelope of X-994 fibers. Fiber slippage in gripping wax was studied critically and was found to have negligible effect on gage lengths above 0.1 cm. The increasing effect on shorter fiber lengths depends on the slope of the strength versus length curve. Analysis of failure distribution curves of X-994 fibers in the short fiber range indicates the presence of two types of defects: surface, and possibly structural. The effect on strength of the two types varies proportionally as fiber length decreases. A theoretical treatment of failure distributions resulting from mixed flaw populations supports analysis of test results. (Author)

AD-289 334 Div. 14, 22, 11
(TISTM/TCG) OTS price $.75

Rock Island Arsenal Lab., Ill.
EFFECT OF RATE OF OIL SEPARATION ON THE LUBRICITY OF AUTOMOTIVE AND ARTILLERY GREASE,
by Max T. Fisher. 31 July 62, 22p. incl. illus. tables, 9 refs. (Rept. no. 62-2613)
(Proj. 593-21-060)
Unclassified report

DESCRIPTORS: *Greases, *Oils, *Lubrication, Separation, Lithium compounds, Calcium compounds, Stearates, Hydroxides, Soaps, Friction, Mineral oils, Physical properties, Bearings, Tests, Storage, Stability, Test equipment.

Some significant, but not outstanding, differences in wear were found when lithium 12-hydroxystearate thickened mineral oil greases of the same composition, but different rates of oil separation, were tested at various loads in the Shell 4-Ball Wear Machine. Specification MIL-G-10924A type greases were prepared (anhydrous calcium 12-hydroxystearate-light mineral oil) having the same composition but different bleeding rates. Shell 4-Ball, Timken, and LFW-3 Lubricant Testers showed no sifnificant difference in the lubricity of these greases. Shell 4-Ball Wear tests on oil depleted greases of this type showed pronounced reduction in wear. Based on this decreased wear and other work that shows greases with higher soap concentrations

having longer bearing performance lives, it is conceivable that wheel bearing performance superior to that using unbled grease could be attained at temperatures above 32 F. (Author)

AD-289 360 Div. 14, 17
(TISTM/BRW) OTS price $1.00

National Research Corp., Cambridge, Mass.
METALLIZED FABRICS RESEARCH.
Summary rept., 30 Sep 60-31 Jan 61,
by Leo B. Hieblinger and John S. Light.
28 Feb 61, 27p. incl. illus. tables.
(Contract DA 19-129-qm-1693, Proj. no. 44-1-207)
Unclassified report

DESCRIPTORS: *Textiles, *Metal coatings, Protective clothing, Glass textiles, Synthetic fibers, Nylon, Gold, Silver, Aluminum, Plastics, Metal films, Vapor plating, Thermal conductivity, Tests, Heat, Reflection, Zinc, Abrasion, Mechanical properties, Thermal insulation.

The limiting value of thermal porosity for Al-coated fabrics appears to be about 25%. Any subsequent improvement would come from using a metallizing process where the substrate would not be exposed at a normal angle to metal vapors, but where it would be exposed in such a way that the vapors would coat all of the surface of the yarn uniformly. All substrates show a marked decrease in the breaking strength of the fabric after cleaning, an operation which removes oils and plasticizer films as a prerequisite to metallizing. Abrasion tests indicate that wear does not materially decrease the efficiency of metallized fabric as a barrier to thermal radiation, since most effective abrasion takes place at the contact points only. Metallizing both sides of a substrate decreases the thermal porosity of the substrate significantly. The thermal porosity of a fabric decreases more than 5% when Au or Ag metallizing is substituted for Al. (Author)

AD-289 362 Div. 14, 4
(TISTM/ODN) OTS price $2.25

Illinois U., Urbana.
STUDY LEADING TO THE DEVELOPMENT OF POLYMERS FOR USE IN HIGH TEMPERATURE,
Final summary rept.
by T. Moeller, A. Vandi and others. 1 Oct 62,
79p. incl. tables, 54 refs.
(Contract DA 11-022-ORD-2956)
Unclassified report

DESCRIPTORS: *Polymers, Sulfonyl radicals, Chlorides, Ammonia, Liquefied gases, Alkyl radicals, Sulfamyl radicals, Amines, Polymerization, Sulfides, Sodium compounds, Sulfamic acids, Sulfuric acid, Amides, Ethanes, Physical properties, Thermal stresses, Halogen compounds, Bromides, Fluorides, Chemical reactions, Sulfones, Grignard reagents, Dipole moments, Synthesis.

A comparative study of three approaches to the synthesis of sulfamide showed that reaction of sulfuryl chloride with excess liquid ammonia at low temperatures can be used to prepare the compound with reasonable efficiency. A series of ammonolysis and aminolysis reactions of sulfamide and of N,N-dialkylsulfamyl chlorides with aliphatic and aromatic amines were carried out, and several new N-substituted derivatives of sulfamide prepared and characterized. Their liquid ranges and thermal stabilities were evaluated. When sulfamide is allowed to react with aliphatic polyamines without solvent, deammonation takes place readily with the formation of definite products. Monomeric compounds are attainable by melt-polymerization at 90 C, whereas a linear polymer is produced when 1,6-hexane-diamine reacts with sulfamide under appropriate conditions. Non-metal polysulfides were obtained by treating the hydrosulfide-sulfur solution in ammonia with a diacid chloride. (Author)

AD-289 388 Div. 14
(TISTM/ODN) OTS price $2.60

Narmco Industries, Inc., San Diego, Calif.
POTENTIAL OF FILAMENT WOUND COMPOSITES.
Monthly progress rept. no. 18, 1-31 Oct 62,
by D. Stevens and W. Otto. 31 Oct 62, 19p. incl. illus. tables.
(Contract NOw 61-0623-c)
Unclassified report

DESCRIPTORS: *Composite materials, *Filament wound construction, *Glass textiles, Fibers, Stresses, Glass, Tensile properties, Resins, Shear stresses, Tests, Loading, Reinforcing materials.

A number of collimation tests were made on various production strands and roving, and the test data are tabulated. Continued work on single-filament pull-out tests is reported and the developed test procedures are described. Biaxial tests on Scotchply fiber glass composites are described. The test specimens in the maltese cross configuration are described along with the test procedure. Some surprising strength and stress-strain data are reported, and future tests to explain the data are outlined. (Author)

AD-289 399 Div. 14, 25, 4
(TISTM/ODN) OTS price $3.60

Frick Chemical Lab., Princeton U., N. J.
GLASS TRANSITION TEMPERATURES OF ACRYLONITRILE-ACRYLATE COPOLYMERS,
by R. Schaffhauser, A. Evnin, and A. V. Tobolsky.
Oct 62, 9p. illus. tables, 16 refs. (ONR technical rept. no. RLT-52)
(Contract Nonr-185807, Proj. NR 356-377)
Unclassified report

DESCRIPTORS: *Polymers, *Acrylonitriles, *Acrylic resins, *Copolymerization, Butyl radicals, Methyl radicals, Ethyl radicals, Phase transitions, Density, Mixtures, Solubility, Solutions, Theory, Carbon tetrachloride, Heat of solution, Energy, Glass, Molecular association, Transition temperature.

The copolymer systems acrylonitrile-butyl acrylate, acrylonitrile- 2-ethyl hexyl acrylate and acrylonitrile-methyl methacrylate were investigated. Their cohesive energy densities and characteristic viscoelastic parameters were determined and compared with values calculated from various semi empirical relationships. The copolymer glass transition temperatures were found to lie between those of their related homopolymers. (Author)

AD-289 546 Div. 14, 25, 32
(TISTM/EJH) OTS price $3.50

Hughes Aircraft Co., Culver City, Calif.
ELECTRICAL AND ELECTRONIC PROPERTIES OF MATERIALS INFORMATION RETRIEVAL PROGRAM.
Final rept., 5 July 61-15 June 62,
by H. Thayne Johnson, Emil Schafer, and Everett M. Wallace. June 62, 219p. incl. illus. tables (Rept. no. P62-18)
(Contract AF 33(616)8438, Proj. 1(8-7381))
(ASD TDR 62-539) Unclassified report

DESCRIPTORS: *Documentation, *Data storage systems, *Data processing systems, *Semiconductors, *Insulating materials, *Electrical properties, Electronics, Indexes, Abstracting, Punched card methods, Materials.

A documentation system has been established for abstracting, indexing, and retrieving data relating to the electrical and electronic properties of insulator and semiconductor materials. The system is a coordinate index type immediately usable as a manual system and adaptable to machine methods of data storage and retrieval. The data acquired and indexed is published in the form of property tables, data sheets, and summary reviews. Methods used in the documentation, compilation, and evaluation of the data are described and examples of format illustrated. Appended are an index to semiconductor and insulation material names and a glossary of selected properties and symbols. (Author)

AD-289 547 Div. 14, 4
(TISTM/ODN) OTS price $5.60

Southern Research Inst., Birmingham, Ala.
A STUDY OF POLYMERS CONTAINING SILICON-NITROGEN BONDS.
Summary technical rept. no. 14, 1 Dec 59-31 Jan 61,
by Robert E. Burks, Jr. and Thomas W. Ray.
20 Feb 61, 48p. incl. illus. tables, 18 refs.
(Contract DA01-009-506-ORD-829, Proj. 1144)
Unclassified report

DESCRIPTORS: *Polymers, *Silicon compounds, *Nitrogen compounds, Silanes, Heat resistant polymers, Stability, Silicates, Ammonia, Methyl radicals, Hydrolysis, Phenyl radicals, Physical properties, Organic solvents, Polymerization, Catalysts, Elastomers, Organic compounds, Ethyleneamines, Chemical analysis, Chemical reactions, Films, Silicon coatings, Solids, Synthesis.

It was shown that the silazanes either have or can be converted to materials that have the following encouraging properties: a wide variety of physical states including mobile liquids, oils, greases, elastomers, and vitreous solids; a high degree of thermal and chemical stability in comparison with siloxanes and flurocarbons. Two separate areas of silicon-nitrogen chemistry were explored: the reaction of ammonia with silicon tetrachloride and tetraethylorthosilicate and the reaction of ammonia and amines with dichlorosilanes to produce silazanes. A silazane made from ethylenediamine can be converted to an elastomer that is resilient at -78 C and after heating at 450 C. Hexaphenylcyclotrisilazane and a mixture of methylphenyl silazanes can be converted to vitreous solids having even greater thermal stability. Blends of these three silazanes can be made into various types of flexible coatings that adhere well to metals and other surfaces. These coatings are essentially inert to organic solvents and aqueous acids and alkalis. (Author)

AD-289 560 Div. 14
(TISTM/AJM) OTS price $2.60

Pennsylvania State U. Coll. of Mineral Industries, University Park.
ANISOTROPY AND STRENGTH OF CERAMIC BODIES.
Progress rept. no. 3, 15 Mar-15 July 62,
by W. R. Buessem and H. A. McKinstry. 30 July 62, 23p. incl. tables, 16 refs.
(Contract Nonr 65627)
Unclassified report

DESCRIPTORS: *Ceramic materials, *Titanates, *Silicates, Aluminum compounds, Lithium compounds, Elasticity, Lattices, Hysteresis, X-ray diffraction analysis, Theory, Mathematical analysis, Mechanical properties, Thermal expansion.

The bulk thermal expansion of beta-eucryptite, beta-spodumene and aluminum titanate, exhibit hysteresis behavior. The expansion is negative at room temperature and becomes positive at higher (about 500 C) temperatures. On cooling, the materials contract rapidly at first; at lower temperatures, however, an expansion occurs. The strength and modulus of elasticity increase with temperature. A hysteresis effect is also associated with these properties. (Author)

15. MATHEMATICS

AD-287 901 Div. 15, 8
(TISTA/MAK) OTS price $2.60

Applied Mathematics and Statistics Lab., Stanford U., Calif.
ON SPECTRAL ANALYSIS WITH MISSING OBSERVATIONS AND AMPLITUDE MODULATION,
by Emanuel Parzen. 2 Nov 62, 19p. 7 refs.
(Technical rept. no. 46)
(Contract Nonr-22521, Proj. NR-042-993)
Unclassified report

DESCRIPTORS: *Statistical analysis, *Amplitude modulation, *Series, Statistical functions, Statistical processes, Statistical tests.

The notion of an asymptotically stationary time series and its spectral analysis was considered earlier (Bulletin of International Statistical Institute, 33rd Session, Paris). An important example of an asymptotically stationary time series is an amplitude modulated stationary time series. In this note, the problem of spectral analysis of stationary normal time series with missing observations, recently treated by Jones (Annals Math. Stat. 32:455-461) is treated as a special case of the problem of spectral analysis of an amplitude modulated stationary normal time series. (Author)

AD-287 966 Div. 15
(TISTP/MAK) OTS price $1.60

Mathematics Research Center, U. of Wisconsin, Madison.
LORENTZ'S PENDULUM PROBLEM,
by J. E. Littlewood. Sep 62, 16p. 1 ref.
(MRC technical summary rept. no. 339)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Differential equations, *Partial differential equations, *Quantum mechanics, Time.

At the Solvay Congress in 1911 Lorentz raised the question: How does a simple pendulum behave when the suspending thread is gradually shortened. This was relevant to the quantum theory of the time. For the equation $\ddot{x} + \omega^2 x = 0$, with ω subject to natural conditions governing its slow change, it was conjectured that the energy $\omega^2 x^2 + \dot{x}^2$ is nearly proportional to ω, or that

$H(\omega) = \omega x^2 + \dot{x}^2/\omega$ is approximately constant. The paper confirms this, and also the further conjecture that $H(\infty) - H(-\infty) = \Omega(\epsilon^n)$ for every n. (Author)

AD-288 006 Div. 15
(TISTP/GRW) OTS price $2.60

Mathematics Research Center, U. of Wisconsin, Madison.
THE DOMAIN OF DEPENDENCE INEQUALITY AND INITIAL-BOUNDARY VALUE PROBLEMS FOR SYMMETRIC HYPERBOLIC SYSTEMS,
by Calvin H. Wilcox. Aug 62, 20p. 15 refs. (MRC Technical summary rept. no. 333)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Partial differential equations, *Inequalities, Matrix algebra, Energy, Wave transmission.

The usual systems of partial differential equations that govern wave propagation (equations of acoustics, electromagnetics, magnetohydrodynamics, elasticity, etc.) have an energy integral and corresponding Poynting vector which describes the flow of energy. The most general systems of this type were introduced by K. O. Friedrichs, who called them 'symmetric hyperbolic' systems. An a priori domain of dependence inequality is proved for solutions of such systems in cylindrical space-time domains subject to local, dissipative boundary conditions. The inequality expresses the fact that energy propagates with a finite speed in such systems. It is used to derive existence, uniqueness and regularity theorems for solutions of initial-boundary value problems for symmetric hyperbolic systems. These problems provide a mathematical model for the diffraction by obstacles of the waves described by such systems. (Author)

AD-288 007 Div. 15
(TISTP/GRW) OTS price $7.60

Mathematics Research Center, U. of Wisconsin, Madison.
ON IMPLICIT FUNCTION THEOREMS AND THE EXISTENCE OF SOLUTIONS OF NON-LINEAR EQUATIONS,
by Hans H. Ehrmann. Aug 62, 74p. 25 refs. (MRC Technical summary rept. no. 343)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Functional analysis.

Some existence theorems are presented for the solutions of certain non-linear equations, both local and global theorems. The generality of the local theorems is determined largely by the spaces which contain the domain and the range of the operator in the equation and the elements on which the operator depends. (Author)

AD-288 008 Div. 15
(TISTP/GRW) OTS price $4.60

Mathematics Research Center, U. of Wisconsin, Madison.
FORCED OSCILLATIONS AND CONVEX SUPERPOSITION IN PIECEWISE-LINEAR SYSTEMS,
by B. A. Fleishman. Aug 62, 30p. illus. 11 refs. (MRC Technical summary rept. no. 336)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Differential equations, *Functions, Linear systems, Oscillation, Damping.

Several aspects of the theory of forced oscillations of piecewise-linear systems are considered. The general problem of determining such periodic solutions is formulated and the principal methods of solving the problem are described briefly. By way of illustration, forced periodic solutions of the simplest kind are determined for a second-order on-off system subject to a sinusoidal external force. Piecewise-linear systems are shown to possess a property of convex superposition with respect to any set of responses (to different excitations) which are synchronous, i.e., are in phase as they switch from one linear branch of the piecewise-linear function to another. Finally, for sets of periodic responses which are almost synchronous, a conjecture is offered concerning approximate superposition; in this connection the example involving the second-order system is reconsidered. (Author)

AD-288 009 Div. 15
(TISTP/GRW) OTS price $3.60

Mathematics Research Center, U. of Wisconsin, Madison.
A CONTRIBUTION TO THE ASYMPTOTIC ANALYSIS IN LATTICE-ORDERED GROUPS,
by R. Bojanic, J. Karamata, and M. Vuilleumier. Sep 62, 30p. incl. illus. 11 refs. (MRC Technical summary rept. no. 329)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Algebra, *Functional analysis, Functions, Real variables.

Let $f(x)$ be a real-valued and continuous function defined on R. It is well-known that if, for every fixed t, $\lim \{f(x + t) - f(x)\} = 0$, as x approaches infinity, then the convergence is uniform for t in any closed interval. The statement still holds for functions of several variables, i.e., in the ordered real space R to the nth power with the Pringsheim definition of convergence. One can show this by considering real valued functions defined on a lattice-ordered group. It is then possible to obtain some extension of this result if one requires that the lattice satisfies some appropriate conditions and if one takes the Moore-Smith definition of convergence. (Author)

AD-288 010 Div. 15
(TISTP/GRW) OTS price $3.60

Mathematics Research Center, U. of Wisconsin, Madison.
HIGH-FREQUENCY APPROXIMATIONS TO ELLIPSOIDAL WAVE FUNCTIONS,
by F. M. Arscott. July 62, 36p. 4 refs. (MRC Technical summary rept. no. 338)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Ellipsoids, *Differential equations, Functions, Quantum mechanics.

The ellipsoidal wave equation is the ordinary differential equation which arises when the reduced wave equation $\nabla^2 V + {}^2 V = 0$ is separated in ellipsoidal coordinates; doubly-periodic solutions of this equation are known as ellipsoidal wave functions. Approximations to the latter, in the form of asymptotic series

valid for χ^2 large positive or large negative, were given but the analysis was incomplete in that the values of two integral parameters were left undetermined. This gap is filled, the complete results re-calculated and the connections established between the asymptotic series and the standard solutions in various parts of the plane. As a by-product, some unpublished transformation formulae are given, linking ellipsoidal wave functions with negative χ^2 to those with positive χ^2. (Author)

AD-288 011 Div. 15, 16
(TISTP/GRW) OTS price $2.60

Mathematics Research Center, U. of Wisconsin, Madison.
A PROBABILITY METHOD FOR TREATING INBREEDING SYSTEMS, ESPECIALLY WITH LINKED GENES,
by Motoo Kimura. 1962, 25p. illus. 9 refs. (MRC technical summary rept. no. 337)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Genetics, *Probability, Equations, Mathematical prediction, Chromosomes, Statistical distributions.

A simple method was developed to handle inbreeding systems in terms of probability rather than in terms of correlation as in Wright's theory. As applied to the case of a single gene, the method is very similar to Malecot's approach which makes use of the concept of identity by descent. As applied to linked loci, it yields all the main results through the method of path coefficients. Though it should be equivalent to Wright's method, the present method may have an advantage in that it utilizes only simple probability calculations and no new concept or preliminary knowledge of correlation or path analysis is required. In addition to the conventional inbreeding systems, the method was applied to cases of partial self-fertilization and a circular mating system. The utility and limitation of the present method to handle more general cases were also discussed. (Author)

AD-288 012 Div. 15, 16
(TISTP/GRW) OTS price $2.60

Mathematics Research Center, U. of Wisconsin, Madison.
THE MEASUREMENT OF EFFECTIVE POPULATION NUMBER,
by Motoo Kimura and James F. Crow. Aug 62, 21p. table, 13 refs. (MRC Technical summary rept. no. 335)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Population, *Genetics, *Probability, Group dynamics, Statistical distributions, Chromosomes.

The effective population number can be defined either in terms of the amount of increase in homozygosity (inbreeding effective number) or the amount of gene frequency drift (variance effective number). Under many circumstances these are the same, but not in general. The effective number is considered in terms of an idealized population in which each individual parent has an equal expectation of progeny. The effective number of an actual population is defined as the size of an idealized population with the same amount of inbreeding or random gene frequency drift as the population under consideration. Formulae are given for determining both kinds of effective numbers when the population is monoecious (including self fertilization) and when there are separate sexes. The formulae are summarized along with special cases of interest. (Author)

AD-288 080 Div. 15
(TISTP/TL) OTS price $1.60

Brown U. Div. of Applied Mathematics, Providence, R. I.
IDEMPOTENT MEASURES ON A COMPACT TOPOLOGICAL SEMIGROUP,
by M. Heble and M. Rosenblatt. Aug 62, 12p. 6 refs. (Technical rept. no. 7)
(Contract Nonr-56229, Proj. NR-042-217)
Unclassified report

DESCRIPTORS: *Measure theory, *Topology, Probability, Sequences, Convex sets, Numerical analysis, Special functions.

AD-288 128 Div. 15, 5
(TISTP/GRW) OTS price $7.60

Operations Evaluation Group, Office of Naval Operations, Washington, D. C.
THE BEHAVIOR OF A SINGLE CHANNEL QUEUE WITH PERIODIC EXPONENTIALLY DISTRIBUTED INTERARRIVAL TIMES AND SERVICE TIMES,
by R. R. V. Wiederkehr. 17 Sep 62, 1v. incl. illus. (Interim research memo. no. IRM-23)
Unclassified report

DESCRIPTORS: *Communication systems, *Probability, Partial differential equations, Operations research, Matrix algebra.

The operation of the Naval Communication System was studied from a mathematical model which simulates the behavior of the system. This model was used to predict possible improvements in the operation of the system. Since messages passing through the Naval Communications System generally form queues or waiting lines, it is natural to construct the mathematical model using queueing theory. A mathematical model is developed for a simple queueing system, a single channel queue with exponential and periodically varying interarrival and service time distributions. In future work this model will be generalized to include more complex queueing systems, such as queues with priorities and networks of queues. Two methods are applied for solving equations which describe the queueing systems: a generating function method, and a matrix method. The generating function method produces not only approximate expressions for the mean and variance of the number of messages in the system as a function of time but also conditions for queue stability. The matrix method produces expressions for the probability that there are n messages in the system at time t. Both of these methods are applicable to more complex queueing systems. Other results include an expression relating the mean messages delay time to the number of messages in the system and to the expected number of arrivals, and four measures of effectiveness for queueing systems. (Author)

AD-288 235 Div. 15
(TISTP/TL) OTS price $1.10

Rand Corp., Santa Monica, Calif.
A PROOF OF A FIXED-POINT THEOREM OF KAKUTANI,
by J. W. Kitchen, Jr. Nov 62, 7p. 2 refs.
(Research memo. rept. no. RM-3340-PR)
(Contract AF 49(638)700, Proj. Rand)
Unclassified report

DESCRIPTORS: *Topology, *Measure theory, *Convex sets, Mapping, Vector analysis, Harmonic analysis, Integral, Groups (Mathematics).

The objective of this analysis is to give an elegant and conceptually interesting proof of a fixed-point theorem of Kakutani, and to elucidate the intimate connection between this theorem and the existence of Haar measure on a compact group. The only difficult point in the discussion is the construction of an appropriate integral, and even here the arguments are essentially duplication of familiar arguments in the theory of the elementary Riemann integral. (Author)

AD-288 239 Div. 15, 12
(TISTP/WH) OTS price $1.60

System Development Corp., Santa Monica, Calif.
ON ASYMPTOTIC CONVERGENCE OF THE ESTIMATES OF TRAJECTORY PARAMETERS USING AN OPTIMUM STAGEWISE SMOOTHING PROCEDURE,
by Marvin Blum. 24 Oct 62, 12p. 2 refs. (Rept. no. SP-332/000/02)
Unclassified report

DESCRIPTORS: *Orbital flight paths, *Analysis of variance, *Matrix algebra, *Mathematical prediction, Satellite vehicle trajectories, Series, Partial differential equations.

In the examples cited it is desired to produce predictions of the future position of the satellite as a function of time. Thus, if the parameters were known without error, the future position as a function of time would be known. The central problem is to estimate the parameters from the data, e.g., alpha = h(F1, F2 ..., Fn). As new observations become available one can improve the statistical precision of the position prediction by improving the statistical precision of one's knowledge of the parameters. The investigation of the effects of the influence coefficients (as the amount of data increases) on the parameter estimation precision using a stagewise optimum smoothing procedure is the main concern of this analysis. (Author)

AD-288 279 Div. 15
(TISTP/WH) OTS price $1.60

Northwestern Technological Inst., Evanston, Ill.
OPTIMIZING ENGINEERING DESIGNS UNDER INEQUALITY CONSTRAINTS,
by A. Charnes and W. W. Cooper. Aug 62, 9p. 7 refs. (ONR research memo. no. 64)
(Contracts Nonr-122810, Proj. 047-021 and Nonr-76001, Proj. 047011)
Unclassified report

Presented as part of a talk before the course "Foundations and Tools for Operations Research and the Management Sciences", June 29, 1962, University of Michigan, Ann Arbor, Michigan.

DESCRIPTORS: *Linear programming, *Inequalities, Operations research.

Recent developments in mathematical research--e.g., in linear programming--are applied to additional areas of engineering design problems. Something more is needed, however, if this is to be done in a completely satisfactory manner. In particular the Duffin-Zener formulations (and results) need to be extended so that it becomes possible (a) to deal with the kinds of constraints that are often imposed on the design choices and (b) to establish contact with available computational theory and computer codes, etc., as well as (c) to provide a basis for further developments in computational methods and theory that is specially oriented to this class of problems. (Author)

AD-288 429 Div. 15
(TISTB/SAT) OTS price $1.60

Brown U., Div. of Applied Mathematics, Providence, R. I.
A NOTE ON GLOBAL INSTABILITY OF COMPETITIVE EQUILIBRIUM,
by David Gale. 1962, 10p. (Technical rept. no. 2)
(Contract Nonr-562(15))
Unclassified report

DESCRIPTORS: *Economics, Stability, Mathematical prediction.

AD-288 434 Div. 15
(TISTB/CCH) OTS price $1.10

Aerospace Information Div., Washington, D. C.
REMARKS BY L. S. PONTRYAGIN.
25 July 62, 1p. (AID rept. no. 62-108; Trans. from Teterin, N. Mathematics and life. Vechernyaya, Moskva, 4p. 14 May 62)
Unclassified report

DESCRIPTORS: *Mathematics, Oscillation, Control, Theory.

AD-288 501 Div. 15
(TISTP/WH) OTS price $1.10

Boeing Scientific Research Labs., Seattle, Wash.
ELEMENTARY RELATIONS BETWEEN UNIFORM AND NORMAL DISTRIBUTIONS IN THE PLANE,
by George Marsaglia. Aug 62, 5p. incl. illus. 6 refs. (Mathematical note no. 269; Document no. D1-82-0197)
Unclassified report

Also available from the author.

DESCRIPTORS: *Statistical distributions, *Statistical functions, *Numerical methods and procedures, Digital computers, Programming.

AD-288 585 Div. 15
(TISTB/AW) OTS price $1.10

System Development Corp., Santa Monica, Calif.
SIMULTANEOUS CONFIDENCE INTERVALS FOR DIFFERENCES OF CLASSIFICATION PROBABILITIES,
by John E. Walsh. 5 Nov 62, 5p. 3 refs. (Rept. no. SP-1015)
Unclassified report

DESCRIPTORS: *Statistical tests, *Statistical distributions, Classification, Sampling, Medicine.

Given a group of individuals with a common characteristic, such as having (or having had) a given disease, there can be an interest in the probabilities associated with a specified set of classifications for these individuals. For example, the common characteristic could be lung cancer and the classifications could be cigarette smoker, cigar or pipe smoker, cigarette and cigar or pipe smoker, and nonsmoker. Often, the individuals can be considered to represent independent sample values from a multinomial probability distribution that has these classifications as categories. Given two separate groups having a different characteristic but the same classifications, there can be an interest in comparing their multinomial probabilities for

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each of the classifications. One way to make this comparison is to consider the differences of the probabilities for the classifications. Separate confidence intervals for the differences of the two probabilities are developed for each classification, with these intervals being such that the large sample probability is at least a specified amount that all the relationships are simultaneously satisfied. (Author)

AD-288 597 Div. 15
(TISTP/GRW) OTS price $1.60

Institute of Mathematical Sciences, New York U., N. Y.
ON A FUNCTIONAL EQUATION ARISING IN THE THEORY OF QUEUES,
by Herman Hanisch and Warren M. Hirsch. Oct 62, 18p. 2 refs. (Rept. no. IMM-NYU 303)
(Contract Nonr-28538)
Unclassified report

DESCIPTOS: *Equations, *Pobability, Integrals, Integral transforms.

The following functional equation which occurs in the theory of queues is considered:

$$(1)\quad \phi(x) = \int_{0,\infty} \phi(x-t+\tau)\,dF(t)\,dG(\tau) + \int_{0,x} (1-\alpha)\,(1-F(x))\,\phi(t)\,dG(t) + \int_{[0,\infty)}$$

Here is any real number in the interval $0 < \alpha \leq 1$, and F(x) and G(x) are arbitrary right-continuous distribution functions bounded by 0 and 1, and such that $F(x) = G(x) = 0$ for $x < 0$. Equation (1), with $\alpha = 1$, is satisfied, for example, by the probability $\phi(x)$ that infinitely many customers will be served during the busy period of a single server queue in which (1) the first customer has service time x, (2) the service times of the remaining customers are independent, identically distributed random variables having distribution function G, and (3) the inter-arrival times are independent, identically distributed random variables with distribution function F. It is also satisfied, with arbitrary, by the probability $\phi(x)$ of serving infinitely many members of an infinite moving queue whose first member is initially a distance x from a barrier at which the server suffers a risk of absorption whenever a queue element arrives unserviced. (Author)

AD-288 710 DIV. 15
(TISTW/RD) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
DETERMINING ENERGY DISPERSION FUNCTIONS BY AN OSCILLATORY SYSTEM WITH MANY DEGREES OF FREEDOM,
by P. M. Senik. 13 June 62, 6p. (Trans. no. FTD-TT-62-382 from Prikladna Mekhanika, 7:3, pp. 253-257, 1961)
Unclassified report

DESCRIPTORS: *Nonlinear systems, Oscillation, Damping, Polynomials, Energy, Velocity, Functions.

AD-288 790 Div. 15
(TISTW/RD) OTS price $1.10

System Development Corp., Santa Monica, Calif.
THE BEST ESTIMATE OF RELIABILITY IN THE EXPONENTIAL CASE,
by E. L. Pugh. 20 July 62, 7p. (Rept. no. SP-895/000/00)
Unclassified report

DESCRIPTORS: *Reliability, Probability, Failure (Mechanics), Mathematical analysis, Statistical analysis.

AD-288 823 Div. 15
(TISTB/AW) OTS price $5.60

System Development Corp., Santa Monica, Calif.
TECHNIQUES OF SYSTEM ANALYSIS AND DESIGN: GAME THEORY,
by Richard C. Kao and John Staudhammer.
26 Jan 62, 58p. incl. illus. tables, 8 refs.
(Technical memo. no. TM-679/002/00)
Unclassified report

DESCRIPTORS: *Games theory, Decision making, Operations research, Matrix calculus, Linear programming, Inequalities.

The theory of games as a theory of decision-making in a competitive environment is defined. The theory of games is an important tool in system analysis and design because of two factors: (1) game theory furnishes a rational basis for analyzing conflict of interest situations, and (2) game theory formulation of a problem may enable the designer to identify irrelevant and redundant information about competitive situations. (Author)

AD-288 824 Div. 15
(TISTB/AW) OTS price $6.60

System Development Corp., Santa Monica, Calif.
TECHNIQUES OF SYSTEM ANALYSIS AND DESIGN: THE THEORY OF GROUPS,
by Marshall M. Cohen. 20 Sep 62, 66p. 6 refs.
(Technical memo. no. TM-679/004)00)
Unclassified report

DESCRIPTORS: *Groups (Mathematics), *Algebras, Physics, Crystals, Quantum mechanics, Theory.

Some of the ideas of modern algebra are introduced. The theory of groups is used for introducing the new algebraic viewpoint as well as the mode of operation and some of the fundamental concepts of modern algebra. The theory of groups seems ideally suited for these purposes because the type of algebraic system called a group is conceptually simple and is fundamentally important. (Author)

AD-288 828 Div. 15
(TISTB/LMH) OTS price $1.60

School of Aerospace Medicine, Brooks Air Force Base, Tex.
ON COMPARING MULTINOMIAL PROBABILITIES,
by Ruth Z. Gold. June 62, 13p. incl. tables, 8 refs. (Rept. no. 62-81)
Unclassified report

DESCRIPTORS: *Probability, *Statistical data, Numerical methods and procedures, Linear systems, Survival, Analysis of variance, Statistical processes.

Two methods are presented for constructing simultaneous confidence intervals for linear functions of the unknown probabilities in independent sequences of multinomial trials. Both methods involve very simple calculations and have been illustrated by examples taken from the medical literature. The first method permits an infinite number of intervals while the second requires that their number be finite and that the particular linear functions be specified in advance. Each method appears to be advantageous in different situations. The fact that method I permits us to decide upon the contrasts of interest on the basis of the observations, makes it desirable in some instances, such as numerical example 1 of section 5. However, the price one must pay for the privilege of letting the data point out which intervals to construct is long intervals. (Author)

AD-288 831 Div. 15
(TISTP/GRW) OTS price $1.60

System Development Corp., Santa Monica, Calif.
APPROXIMATION OF FUNCTIONS ON THE INTEGERS,
by Gene F. Rose and Joseph S. Ullian. 16 Oct 62, 14p. 5 refs. (Rept. no. SP-678/000/01)
Unclassified report

DESCRIPTORS: *Functions, *Integral equations, Mathematical logic.

AD-288 929 Div. 15
(TISTP/WH) OTS price $1.10

Boeing Scientific Research Labs., Seattle, Wash.
A NOTE ON GENERATING CHI RANDOM NUMBERS,
by M. D. MacLaren. Sep 62, 3p. 1 ref. (Mathematical note no. 270; Document D1-82-0201)
Unclassified report

Also available from the author.

DESCRIPTORS: *Digital computers, *Statistical functions, *Statistical distributions, *Numerical methods and procedures.

Marsaglia (Ann. Math. Stat., Vol. 32:899, 1961) has given a simple method for generating exponential random numbers on a digital computer. A similar method for generating random numbers with the chi distribution is presented. Such random numbers may be used to generate normal random numbers. (Author)

AD-288 931 Div. 15
(TISTP/WH) OTS price $1.10

Boeing Scientific Research Labs., Seattle, Wash.
IMPROVING THE POLAR METHOD FOR GENERATING A PAIR OF NORMAL RANDOM VARIABLES,
by George Marsaglia. Sep 62, 3p. 2 refs. (Mathematical note no. 271; Document D1-82-0203)
Unclassified report

Also available from the author.

DESCRIPTORS: *Digital computers, *Statistical functions, *Statistical distributions, *Numerical methods and procedures.

AD-288 992 Div. 15
(TISTP/JW) OTS price $1.10

Florida State U., Tallahassee.
(No title).
Final technical rept., 1 Sep 60-31 Aug 61,
by E. P. Miles, Jr. 2 Apr 62, 6p.
(Grant AF-AFOSR-61-12A)
(AFOSR 2617) Unclassified report

DESCRIPTORS: *Partial differential equations, *Numerical analysis, Matrix algebra, Computer logic.

AD-289 256 Div. 15
(TISTP/TL) OTS price $6.60

Rocketdyne, Canoga Park, Calif.
STATISTICAL DESIGN OF COMPLEX EXPERIMENTAL PROGRAMS. II. THE DECISION THEORY OF APPROACH TO COMPLEX EXPERIMENTATION.
Interim technical report on Mathematical Techniques of Aeromechanics,
by Mitchell O. Locks. July 62, 58p. incl. illus. tables, 20 refs.
(Contract AF 33(616)7372, Proj. 7071)
(ARL 62-373, pt. 2) Unclassified report

DESCRIPTORS: *Statistical analysis, *Games theory, *Statistical distribution, *Series, *Reliability, Scheduling, Configuration, Probability, Information theory, Design, Tests, Simulation.

An application of decision theory to the analysis of the results of multifactorial experiments and the making of optimum redesign decisions on complex equipment during the period of development are reported. Both the problem of acceptance testing for fixed configurations and that of testing and redesigning variable configurations are treated. A model was developed and simulated on the IBM 7090 computer. A tentative utility function is presented which incorporates the gain of information from testing and losses due to fluctuations from a planned reliability schedule. (Author)

AD-289 293 Div. 15
(TISTP/TL) OTS price $3.60

System Development Corp., Santa Monica, Calif.
STOCHASTIC DUELS,
by Trevor Williams and Clinton J. Ancker, Jr.
5 Nov 62, 30p. incl. illus. 3 refs. (Rept. no. SP-1017/000/00)
Unclassified report

DESCRIPTORS: *Probability, *Real variables, *Statistical processes, Statistical distribution, Statistical analysis, Sampling, Integral equations.

The relative importance of kill probabilities, rates of fire and other parameters in a duel are considered by examining their effect on the probability that a given side will win. Two contestants who fire at each other until one is killed are discussed. In a duel, the time between rounds fired is a random variable of known but different density function for each, and each has a different known but fixed kill probability. The duel begins with both duelists having unloaded weapons and unlimited ammunition supplies. A general solution is obtained in quadrature form and specific solutions are derived for particular firing time distributions and for certain variations in initial conditions. The general solution is obtained and a specific example for the duel with random initial surprise is given. (Author)

AD-289 315 Div. 15, 18
(TISTP/GRW) OTS price $3.60

Army Strategy and Tactics Analysis Group, Bethesda, Md.
MATHEMATICAL MODEL FOR TOPOGRAPHICAL LINE OF SIGHT,
by John A. Albertini and Paul F. Dunn. Oct 62, 28p. incl. illus. tables (STAGTEN 62101)
(In cooperation with Booz-Allen Applied Research, Inc.)
Unclassified report

DESCRIPTORS: *Military operations, *Probability, Simulation, Terrain, Statistical analysis, Tables, Target recognition, Visibility.

The topographical characteristics of a military theater of operations directly influence the performance of communications equipment, target acquisition systems, and flat-trajectory weapons. Consequently, any realistic simulation of combat operations must include simulation of the line-of-sight constraints. Current attempts to computerize land-combat war games are handicapped by inadequate terrain representations and by the difficulties encountered in adapting the play

of line of sight to automation. A parametric method of terrain representation is presented for play of line of sight. The paper delineates the mathematical relationships, in terms of conditional probability density functions, for the probability that line of sight exists beyond a given range, and discusses the relationship between the natural frequency of occurrence of obscuring peaks and the probability functions. It also treats the problem of determining the probability functions. It also treats the problem of determining the probability that line of sight extends beyond a given range when the observation point and the point in questions are separated by an arbitrary number of regional boundaries, with each terrain region characterized by a different peak frequency. (Author)

AD-289 342 Div. 15, 30
(TISTP/WH) OTS price $1.60

George Washington U., Washington, D. C.
A TABULATION OF THE COMPLETE BETA-FUNCTION B(p,q) FOR p = 1, AND A COMPUTER PROGRAM FOR p > q,
by Jerome Bracken. 20 Nov 62, 16p. incl. tables. (Serial no. T-142)
(Contracts Nonr-76103, Nonr-76105 and 76106, Proj. nos. 345 107, 047 001, and 347 008)
Unclassified report

DESCRIPTORS: *Functions, *Digital computers, *Programming.

The complete Beta-function B(p,q) for p = q = 1(1)165 is tabulated, and the computer program for performing this tabulation is presented. A computer program is given for tabulating (B(p,q) for p > q using B(p = q , q) as input. (Author)

AD-289 346 Div. 15
(TISTP/GRW) OTS price $1.10

Battelle Memorial Inst., Geneva (Switzerland).
HOMOTOPICAL COHOMOLOGY AND CECH COHOMOLOGY.
Special technical and scientific rept. no. 5 for 30 Nov 60 on Theoretical Study on Homotopy Theory and Duality for Modules and Spaces,
by Peter J. Huber. 5 Dec 60, 8p. incl. illus. 9 refs.
(Contract DA 91-591-EUC-1436)
Unclassified report

DESCRIPTORS: *Algebraic topology, Functional analysis, Topology.

AD-289 347 Div. 15
(TISTP/GRW) OTS price $2.60

Battelle Memorial Inst., Geneva (Switzerland).
ALGEBRAIC HOMOTOPY GROUPS AND FROBENIUS ALGEBRAS.
Special technical and scientific rept. no. 4 for 30 Sep 60 on Theoretical Study on Homotopy Theory and Duality for Modules and Spaces,
by B. Eckmann and H. Kleisli. Nov 60, 28p. incl. illus. 6 refs.
(Contract DA 91-591-EUC-1436)
Unclassified report

DESCRIPTORS: *Algebraic topology, *Algebras, Sequences.

AD-289 348 Div. 15
(TISTP/GRW) OTS price $3.60

Battelle Memorial Inst., Geneva (Switzerland).
SPECTRAL SEQUENCES FOR HOMOLOGY AND HOMOTOPY GROUPS OF MAPS.
Special technical and scientific rept. no. 3 for 31 Aug 60 on Theoretical Study on Homotopy Theory and Duality for Modules and Spaces,
by B. Eckmann and Peter J. Huber. 13 Sep 60, 34p. incl. illus. 22 rfs.
(Contract DA 91-591-EUC-1436)
Unclassified report

DESCRIPTORS: *Algebraic topology, *Functional analysis, Sequences.

AD-289 387 Div. 15, 30
(TISTP/GRW) OTS price $4.60

Naval Weapons Lab., Dahlgren, Va.
COMPUTING PROGRAMS FOR THE COMPLEX FRESNEL INTEGRAL,
by A. V. Hershey. 19 Nov 62, 1v. incl. illus. tables, 7 refs. (NWL rept. no. 1796)
(NAVWEP rept. no. 7670)
Unclassified report

DESCRIPTORS: *Integrals, *Computers, Polynomials, Coding, Tables, Programming.

The asymptotic series for the complex Fresnel integral with remainder is used in subroutines to evaluate the conventional Fresnel integrals and the probability integral. A series expansion with improved accuracy of calculation is used to evaluate the remainder. A rational polynomial approximation is developed for the complex Fresnel integral. The range of validity of the rational approximation is that part of the complex plane on the negative side which is bounded by the imaginary axis and is outside a circle of unit radius. The complex Fresnel integral correct to thirteen significant digits is tabulated at unit intervals in the argument. (Author)

AD-289 406 Div. 15
(TISTP/JW) OTS price $1.10

Brown U., Providence, R. I.
EXTENSION TO THEORY OF TIME SERIES ANALYSIS.
Final rept., 1 July 58-31 July 62,
by Walter Frieberger. 31 July 62, 7p. (Rept. no. DA-SC-78130)
(Contract DA 36-039-sc-78130)
Unclassified report

DESCRIPTORS: *Series, *Time, *Bibliography, Applied mathematics.

AD-289 410 Div. 15
(TISTP/JW) OTS price $1.60

Columbia U., New York.
ERGODIC MARKOV PROCESSES AND THE UNIQUENESS OF STATIONARY MEASURES,
by Richard Isaac. 25 June 62, 14p. (Rept. no. CU-32-62-Nonr-266(59) MS)
(Contract Nonr-26659, Proj. NR 042-205)
Unclassified report

DESCRIPTORS: *Statistical processes, *Sequence switches, Transformations (Mathematics), Ergometers.

AD-289 417 Div. 15
(TISTP/JW) OTS price $2.60

System Development Corp., Santa Monica, Calif.
THE OPTIMUM ALLOCATION OF RESOURCES AMONG THE ACTIVITIES OF A NETWORK,
by Charles E. Clark. 5 Aug 59, 23p. (Rept. no. SP-95)
Unclassified report

DESCRIPTORS: *Nets, *Computer logic, Statistical analysis, Time, Costs.

Division 15 - MATHEMATICS

AD-289 421 Div. 15
(TISTP/JW) OTS price $1.10

Syracuse U., N. Y.
(No title).
Final technical rept., 1 June 61-31 May 62.
20 June 62, 3p.
(Contract AF 49(638)619)
(AFOSR 2896) Unclassified report

DESCRIPTORS: *Functions, *Matrix algebra, Polynomials, Statistical processes.

AD-289 428 Div. 15
(TISTP/JW) OTS price $1.10

Princeton U., N. J.
AN IDENTITY CONCERNING THE RELATION BETWEEN THE PAASCHE AND LASPEYRE INDICES,
by S. N. Afriat. 31 May 62, 6p. (Research paper no. 3)
(Contract Nonr-185816)
Unclassified report

DESCRIPTORS: *Vector analysis, *Number theory.

AD-289 429 Div. 15
(TISTP/JW) OTS price $1.10

RAND Corp., Santa Monica, Calif.
THE INVERSION OF A CONVOLUTION TRANSFORM WHOSE KERNEL IS A LAGUERRE POLYNOMIAL,
by D. V. Widder. July 62, 5p. (Memo. no. RM-3197-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Special functions, *Polynomials, Integral equations, Velocity.

AD-289 430 Div. 15
(TISTP/JW) OTS price $1.60

Princeton U., N. J.
THE ALGEBRA OF REVEALED PREFERENCE,
by S. N. Afriat. 25 May 62, 14p. (Research paper no. 2)
(Contract Nonr-185816)
Unclassified report

DESCRIPTORS: *Algebras, *Analysis, *Calculus of variations, Complex variables.

AD-289 507 Div. 15
(TISTB/MS) OTS price $3.60

RAND Corp., Santa Monica, Calif.
OPPORTUNISTIC REPLACEMENT OF A SINGLE PART IN THE PRESENCE OF SEVERAL MONITORED PARTS,
by Roy Radner and Dale W. Jorgenson. Nov 62, 29p. 3 refs. (Memo. no. RM-3057-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Failure (Mechanics), *Scheduling, *Quality control, *Maintenance, Mathematical analysis, Probability, Costs.

The significance of this memorandum is that it presents a rigorous mathematical proof of the optimality of a class of policies for replacement of a single randomly failing part in the presence of any number of monitored parts. The previously-cited memoranda used these policies in a series of applications, but they did not give the necessary proof of optimality. Since the mathematical proof contained in this memorandum is theoretically important, it will also be published in a suitable scientific journal, and it is expected that its dissemination will encourage further work on maintenance policies, covering both replacement and inspection, by the increasing number of scientific organizations concerned with these logistic problems. (Author)

AD-289 508 Div. 15
(TISTB/MS) OTS price $2.60

RAND Corp., Santa Monica, Calif.
OPTIMAL ALTITUDE FOR ANTIMISSILE DETONATIONS. A GAME THEORY ANALYSIS,
by J. W. Kitchen, Jr. Nov 62, 25p. incl. illus. 1 ref. (Memo. no. RM-3328-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Guided missiles, *Height finding, *Games theory, Probability, Functions, Detonation, Mathematical analysis.

This memorandum treats a situation where an ICBM plunges toward a target defended by one or more AICBM missiles. It is assumed that if the defender identifies the ICBM and scores a hit within the lethal radius of the AICBM before the ICBM detonates, the ICBM does no damage. If the ICBM detonates first, however, it does an amount of damage that depends on the height of the detonation. The defender has a dilemma. If he tries to knock out the ICBM at a great height, he is less likely to identify and kill it than if he waits until it is lower. On the other hand, if he waits until it is low, it may explode before he attacks it, at an altitude low enough to produce severe damage. The attacker must decide at what altitude he will detonate the ICBM. The defender does not pick the same altitude to detonate his weapons everytime, since then the attacker would detonate the ICBM always just a little above that altitude. Thus the strategies involve random selection of altitudes for both the attacker and the defender. The best strategies for both the attacker and the defender are found, first for the case where there is just one defense missile, and then for the case of multiple defense missiles. (Author)

AD-289 572 Div. 15
(TISTP/GRW) OTS price $5.60

Battelle Memorial Inst., Geneva (Switzerland).
GROUP-LIKE STRUCTURES IN GENERAL CATEGORIES I-MULTIPLICATIONS AND COMULTIPLICATIONS.
Special Technical and Scientific rept. no. 7 for 31 May 61 on Theoretical Study on Homotopy Theory and Duality For Modules and Spaces,
by B. Eckmann and P. J. Hilton. 31 May 61, 52p. incl. illus. 10 refs.
(Contract DA 91-591-EUC-1750)
Unclassified report

DESCRIPTORS: *Algebraic topology, *Groups (Mathematics), Scheduling.

AD-289 573 Div. 15
(TISTP/GRW) OTS price $4.60

Battelle Memorial Inst., Geneva (Switzerland).
HOMOTOPY THEORY IN GENERAL CATEGORIES.
Special Technical and Scientific rept. no. 8 for 31 May 61 on Theoretical Study on Homotopy Theory and Duality for Modules and Spaces,
by Peter J. Huber. 31 May 61, 41p. incl. illus. 9 refs.
(Contract DA 91-591-EUC-1750)
Unclassified report

DESCRIPTORS: *Algebraic topology, *Groups (Mathematics), Scheduling.

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AD-289 574 Div. 15
(TISTP/TL) OTS price $1.10

Battelle Memorial Inst., Geneva (Switzerland).
STANDARD CONSTRUCTIONS IN ABELIAN CATEGORIES.
Special Technical and Scientific rept. no. 9 for 30 June 61 on Theoretical Study on Homotopy Theory and Duality for Modules and Spaces, by Peter J. Huber. 1 July 61, 9p. incl. illus. 5 refs.
(Contract DA 91-591-EUC-1750)
Unclassified report

DESCRIPTORS: *Topology, Groups (Mathematics), Sequences, Convex sets.

This analysis attempts to show that for abelian categories admitting a projective generator and infinite direct sums (or dually, an injective cogenerator and infinite direct products), suitable standard constructions may be defined in an invariant, category-theoretical fashion. With the aid of these standard constructions one obtains projective (injective) resolutions, which do not only depend functorially on the objects to be resolved, but admit also a natural semi-simplicial structure. (Author)

AD-289 584 Div. 15
(TISTP/WH) OTS price $1.60

Rome Air Development Center, Griffiss Air Force Base, N. Y.
PROPERTIES AND TRANSFORMATIONS OF SINGLE THRESHOLD ELEMENT FUNCTIONS,
by Irving J. Gabelman. Oct 62, 13p. 9 refs.
(Rept. no. RADC TDR 62-449)
Unclassified report

DESCRIPTORS: *Algebras, *Special functions, *Mathematical logic.

A large number of Boolean functions may be realized as the output of a single threshold element; however, not all functions are so realizable. Those F_n which are, are said to belong to the class R. No easily applicable criteria have been formulated which enable an unequivocal determination to be made of whether a given $F_n \in R$. There are, however, certain transformations allowable on those $F_n \in R$ which exhibit a closure property - that is, the transformation results in an $F_p \in R$. There are also certain properties of the form of $F_n \in R$ which can be recognized easily. A knowledge of these permissible transformations and observations of the form of a given F_n will, in many instances, allow for the desired determination. This paper, for the most part, examines those permissible transformations and properties of form. (Author)

16. MEDICAL SCIENCES

AD-287 939 Div. 16
(TISTB/MD) OTS price $1.60

Naval Missile Center, Point Mugu, Calif.
A SYSTEM FOR OBTAINING PHYSIOLOGIC DATA DURING FLIGHT.
by C. G. Phipps and G. G. Lucchina. 31 Oct 62, 16p. incl. illus. (Technical memo. no. NMC-TM-62-36)
(WEPTASK RAE-20M018)
Unclassified report

DESCRIPTORS: *Magnetic recording systems, *Monitors, *Medical equipment, Multiplex transmission, Low-pass filters, Transducers, Amplifiers, Recording devices, Oscillographs, Oscilloscopes, Electrocardiography, Data, Electroencephalography, Respirometers, Blood pressure, Physiology, Aviation medicine.

The system in use at Naval Missile Center for obtaining physiologic data during flight is a self-powered, self-contained data-acquisition package capable of recording three channels of physiologic data plus one channel of environmental correlation data. This system is uniquely free of dependence on aircraft modification and telemetry scheduling. A data-playback system is used for recovery and processing of all meaningful data recorded during flight by the data-acquisition package. Recovery involves suitable composite track amplification and discrimination of all data channels. Processing of data includes suitable filtering of function spectrums and production of a multichannel chart record. Incorporated in the playback is a form of tape-speed compensation which attenuates the effects of flutter induced in the recording process. (Author)

AD-288 021 Div. 16
(TISTB/CCH) OTS price $1.60

Colorado U. Medical Center, Denver.
SYSTEMIC EFFECTS PRODUCED BY PHOSPHOLINE IODIDE IN TREATMENT OF GLAUCOMA.
Supplement to Final progress rept.,
by John Humphreys and Joseph H. Holmes. 1961, 18p. incl. illus. tables, 18 refs.
(Contract DA 18-108-405-cml-264)
Unclassified report

DESCRIPTORS: *Opthalmology, *Chemotherapeutic agents, *Eye, Cholinesterase, Iodides, Medical examination, Blood, Diagnosis, Therapy, Phosphorus compounds, Diseases.

In 102 cases of glaucoma, pilocarpine or DFP therapy red cell cholinesterase values did not differ significantly from those obtained in a group of 586 normals. In 24 patients on phospholine iodide therapy a reduction in red cell cholinesterase occurred in 87.5% and was presumed indicative of systemic absorption. Systemic symptoms considered typical of anticholinesterase exposure were present in 9 cases and all had a marked reduction in the red cell cholinesterase. Six cases had a marked reduction in red cell cholinesterase without symptoms. There was a definite correlation between the length of therapy, the dosage and the degree of reduction in red cell cholinesterase. It was proposed that the red cell cholinesterase values should be used as an index of systemic absorption and thus allow the physician to adjust therapy in order to prevent the appearance of symptoms. The findings should be used as an aid in differential diagnosis to distinguish between symptoms caused by these organic phosphorus compounds and by other causes. The use of 2 PAM for treatment and prevention of systemic symptoms was discussed. (Author)

AD-288 149 Div. 16
(TISTB/MD) OTS price $2.60

Massachusetts Inst. of Tech., Cambridge.
EFFECT OF STRESS ON NUTRIENT REQUIREMENTS OF MAN.
Progress rept., 1 Feb-31 Oct 62,
by Nevin S. Scrimshaw. 31 Oct 62, 11p. tables.
(Contract DA 49-193-md-2239)
Unclassified report

DESCRIPTORS: *Nutrition, *Stress (Psychology), Education, Diet, Students, Blood proteins, Blood chemistry, Corticosteroids, Creatinine, Calcium, Nitrogen compounds, Electrolytes (Physiology), Phosphorus compounds, Sodium compounds, Potassium compounds, Excretion, Urine, Metabolic products, Metabolism, Biochemistry.

Eleven M.I.T. freshmen were given a formula diet containing 14% protein, 50% carbohydrate and 36% fat calories to supply the protein and calorie intake to which they were accustomed. Analysis of variance of both nitrogen balance and urinary nitrogen excretion showed no significant differences within the basal periods or the two stress periods, but did show a highly significant decrease in nitrogen balance and increase in nitrogen excretion during the stress periods. Nitrogen absorption was not affected. No correlation with urinary 17-hydroxy steroid excretion was observed. No significant effect on the absorption of calcium, phosphorus, sodium or potassium was noted. Although there was a tendency for urinary excretion of these to increase, the data were not adequate to establish the significance of this observation. Five of these subjects were re-studied for 3 additional consecutive 3-day basal periods in October. Results averaged 10.98 gm. of urinary nitrogen per day compared with 11.83 during the spring basal periods and 14.27 during the stress periods for these same subjects. Thus, urinary nitrogen excretion values during the stress of the examination period are significantly higher than basal periods either before or after. (Author)

AD-288 150 Div. 16
(TISTB/SAT) OTS price $1.10

Tennessee U., Knoxville.
TREATMENT OF VESICANT BURNS.
Final rept., 15 Feb 61-15 Feb 62,
by Roger T. Sherman. 30 June 62, 5p.
Unclassified report

DESCRIPTORS: *Burns, Mustard gas, Vesicants, Histology, Clays, Protein, Therapy.

AD-288 153 Div. 16
(TISTB/SAT) OTS price $1.60

Mauch Labs., Inc., Dayton, Ohio.
THE DEVELOPMENT OF A READING MACHINE FOR THE BLIND.
Summary rept. for 1 July 61-30 June 62,
by Walter G. Nolte and Hans A. Mauch. 30 June 62, 15p.
(Contract V1005M-1943)
Unclassified report

DESCRIPTORS: *Reading machines, Photoelectric cells, Medical equipment, Blindness.

AD-288 165 Div. 16
(TISTB/SAT) OTS price $2.60

National Inst. of Health, Tokyo (Japan).
EXPLANATION OF PATHOGENESIS OF JAPANESE B ENCEPHALITIS AND ESTABLISHMENT OF AVIRULENT STRAINS OF JAPANESE B ENCEPHALITIS VIRUS.
Final rept. pt. 2, 21 Dec 60-20 Dec 61,
by Akira Oya. 20 Dec 61, 21p.
(Contract DA 92-557-FEC-33136)
Unclassified report

DESCRIPTORS: *Encephalitis viruses, *Viruses, Virus diseases, Laboratory animals, Infections, Pathology.

AD-288 188 Div. 16
(TISTB/SAT) OTS price $5.60

Biochemical Lab., U. of Virginia, Charlottesville.
ELECTROPHORETIC AND PHOSPHATE ANALYSES OF RED CELL HEMOLYSATES OF STORED BLOOD.
Annual progress rept., 1 Sep 61-1 Aug 62,
by Alfred Chanutin. 1 Aug 62, 34p.
(Contract DA 49-007-md-762)
Unclassified report

DESCRIPTORS: *Blood, Electrophoresis, Adenine derivatives, Binders, Storage.

AD-288 193 Div. 16
(TISTB/SAT) OTS price $2.60

Naval Radiological Defense Lab., San Francisco, Calif.
TWO-DIMENSIONAL THIN-LAYER CHROMATOGRAPHY OF RAT LIVER PHOSPHATIDES,
by W. D. Skidmore and C. Entenman. 11 May 62, 32p. (Rept. no. NRDL TR 563)
Unclassified report

DESCRIPTORS: *Chromatographic analysis, Tissues, Phospholipids, Rats.

AD-288 194 Div. 16
(TISTB/SAT) OTS price $1.60

Naval Radiological Defense Lab., San Francisco, Calif.
EVIDENCE FOR DIRECT STIMULATION OF THE MAMMALIAN NERVOUS SYSTEM WITH IONIZING RADIATION,
by E. L. Hunt and D. J. Kimeldorf. 7 May 62, 16p. (Rept. no. NRDL TR 561)
Unclassified report

DESCRIPTORS: *Behavior, *Radiation effects, Nervous system, Laboratory animals.

AD-288 199 Div. 16
(TISTB/SAT) OTS price $3.60

6th Army Medical Lab., Fort Baker, Calif.
(No title).
Annual research rept., vol. 1, 1 July 61-30 June 62,
by Albert Leibovitz, Thomas R. Oberhofer and others. 30p. (Rept. no. MEDDH-288)
(Proj. 6X61-01-001-01)
Unclassified report

DESCRIPTORS: *Communicable diseases, Venereal diseases, Culture media, Growth, Cells (Biology), Tissues, Fluorescence.

AD-288 221 Div. 16, 20
(TISTB/CCH) OTS price $9.60

USAF Radiation Lab., U. of Chicago, Ill.
(No title).
Quarterly progress rept. no. 45,
by Kenneth P. DuBois. 15 Oct 62, 113p. incl. illus. tables, refs.
(Contract AF 41(657)252)
Unclassified report

Original contains color plates: All ASTIA reproductions will be in black and white. Original may be seen in ASTIA Hq.

DESCRIPTORS: *Radiation effects, *Radiation injuries, Pharmacology, Toxicity, X rays, Gamma rays, Neutrons, Biochemistry, Survival, Radioprotective drugs, Tissues (Biology).

Contents:
Influence of X-irradiation on the development of a thiophosphate-oxidizing enzyme system in the livers of rats
The influence of X-irradiation on pyridine nucleotide-linked dehydrogenases and glucose-6-phosphatase activity of rat tissues
The influence of various chemical compounds on radiation-induced changes in enzyme activities in certain rat tissues
The influence of various chemical compounds on radiation lethality in mice
The mechanism of the radioprotective effects of cyanide and various nitriles
The mechanism of the toxic and radioprotective effects of p-aminopropiophenone and derivatives in mice
The toxicity of rare earth compounds and their influence on radiation lethality
A comparison of the gross pathologic findings in the blood vessels of rats and mice exposed to acute and chronic X-irradiation while receiving various atherogenic and high fat diets

AD-288 400 Div. 16
(TISTB/SAT) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
COSMIC EXPLORERS,
by A. Emme. 8 May 62, 4p. (Trans. no. FTD-TT-62-602 from Sovetskaya Rossiya, 20 Oct 60)
Unclassified report

DESCRIPTORS: *Space medicine, *Space flight, USSR, Algae, Genetics.

AD-288 401 Div. 16
(TISTB/SAT) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
SCIENCE AND LIFE (SELECTED ARTICLES).
19 June 62, 11p. (Trans. no. FTD-TT-62-185 from Nauka i Zhizn', No. 9, pp. 34-36, 78-79, 1961)
Unclassified report

DESCRIPTORS: *Space probes, Rocket flight, USSR, Anoxia, Venus.

AD-288 402 Div. 16
(TISTB/SAT) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command
Wright-Patterson Air Force Base, Ohio.
THE ACTION OF SMALL DOSES OF IONIZING RADIATION

ON PHYSIOLOGICAL FUNCTIONS,
by C. G. Kocherezhkin. 17 May 62, 5p. (Trans. no. FTD-TT-62-657 from Vestnik Akademii Nauk SSSR, No. 10, pp. 136-137, 1961)
Unclassified report

DESCRIPTORS: *Radiation effects, Radiobiology, Nervous system, USSR, Cerebral cortex, Conferences.

AD-288 404 Div. 16
(TISTB/SAT) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
NONTHERMAL ACTION OF MICROWAVES ON THE RHYTHM OF CARDIAC CONTRACTIONS IN ANIMALS,
by A. S. Presman and N. A. Levitina. 7 May 62, 9p. (Trans. no. FTD-TT-62-278 from Byulleten' Eksperimental'noy Biologii i Meditsiny, Vol. 53, No. 1, pp. 41-45, 1962)
Unclassified report

DESCRIPTORS: *Cardiac muscle, *Arrhythmia, Electrocardiography, Laboratory animals, USSR.

AD-288 407 Div. 16
(TISTB/SAT) OTS price $1.60

Army Prosthetics Research Lab., Walter Reed Army Medical Center, Washington, D. C.
EVALUATION OF DACRON CORD,
by John W. Hodge. July 62, 13p. (Technical rept. no. 6213)
(Proj. no. 6X59-01-001-04)
Unclassified report

DESCRIPTORS: *Prosthetics, Dacron.

AD-288 408 Div. 16
(TISTB/SAT) OTS price $1.10

Army Prosthetics Research Lab., Walter Reed Army Medical Center, Washington, D. C.
POROUS LAMINATED PROTECTIVE HEAD SHIELD.
Rept. for Apr-May 62,
by Robert Plumb and John J. Urban. May 62, 8p. (Technical rept. no. 6211)
(Proj. 6X59-01-001-04)
Unclassified report

DESCRIPTORS: *Protective clothing, Helmets, Foam rubber.

AD-288 409 Div. 16
(TISTB/SAT) OTS price $2.60

Army Prosthetics Research Lab., Walter Reed Army Medical Center, Washington, D. C.
POLY (VINYL CHLORIDE) COPOLYMER RESIN GEON 135 IN PLASTISOL FORMULATIONS FOR COSMETIC GLOVE.
Rept. for Dec 61-July 62,
by James C. Eaton, Jr. Aug 62, 28p. (Technical rept. no. 6214)
(Proj. 6X59-01-001-04)
Unclassified report

DESCRIPTORS: *Prosthetics, Polymers, Resins, Gloves.

AD-288 410 Div. 16, 30
(TISTB/CCH) OTS price $1.60

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
RELIABLE COMPUTATION WITH UNRELIABLE CIRCUITRY,
by L. A. M. Verbeek. 1959, 10p.
Unclassified report

Presented at the Proceedings of the Bionics Symposium, Dayton, Ohio, 1960.

DESCRIPTORS: *Neuromuscular transmission, *Information theory, Mathematical computer data, Computers, Nerves, Probability.

AD-288 411 Div. 16
(TISTB/CCH) OTS price $2.60

Reading U. (Gt. Brit.).
RESEARCH ON NEURAL MECHANISMS UNDERLYING PERCEPTION,
by G. K. Wallace. 30 Aug 61, 25p. (Technical note no. 4)
(Contracts AF 61(052)420 and AF 61(052)114)
(AFOSR 2986) Unclassified report

DESCRIPTORS: *Insects, *Neuromuscular transmission, *Visual perception, Stimulation, Sensory perception, Motor reactions, Motion.

AD-288 412 Div. 16
(TISTB/CCH) OTS price $1.60

Naval Medical Field Research Lab., Camp Lejeune, N. C.
(No title).
Quarterly summary of projects.
1 July 62, 10p.
Unclassified report

DESCRIPTORS: *Medical research, *Naval medicine, Insects, Viruses, Pest control, Respiratory diseases, Diseases, X rays, Medical supplies, Instrumentation.

AD-288 413 Div. 16
(TISTB/SAT) OTS price $1.10

Civil Aeromedical Research Inst., Oklahoma City, Okla.
PROBLEMS IN AERIAL APPLICATION: I. SOME BIOCHEMICAL EFFECTS OF LINDANE AND DIELDRIN ON VERTEBRATES,
by Jack W. Daugherty, Dane Eugene Lacey, and Patricia Korty. May 62, 6p. (Rept. no. 62-10)
Unclassified report

DESCRIPTORS: *Insecticides, Hydrocarbons, Liver, Heart, Laboratory animals, Toxicity.

AD-288 415 Div. 16
(TISTB/SAT) OTS price $1.10

Civil Aeromedical Research Inst., Oklahoma City, Okla.
THE EFFECTS OF SIMULATED ALTITUDE ON PENETRATING EYE INJURIES,
by J. Robert Dille, Norris L. Newton, and James F. Culver. May 62, 5p. (Rept. no. 62-12)
Unclassified report

DESCRIPTORS: *Eye, Aviation injuries, Barometric pressure, Altitude chambers, Injuries.

AD-288 416 Div. 16
(TISTB/SAT) OTS price $3.60

Oxford U. (Gt. Brit.).
THE ELECTRORETINOGRAM IN THE COMPOUND EYE OF THE DESERT LOCUST (SCHISTOCERCA GREGARIA FORSKAL),

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by David M. Vowles. 1 July 61, 30p. (Technical note no. 2)
(Contract AF 61(052)420)
Unclassified report

DESCRIPTORS: *Grasshoppers, Light adaptation, Dark adaptation, Eye, Retina.

AD-288 418 Div. 16
(TISTB/CCH) OTS price $1.60

Naval Radiological Defense Lab., San Francisco, Calif.
EVALUATION AND CALIBRATION OF AN ELECTRONIC PARTICLE COUNTER FOR MULTISPECIES BLOOD CELL ENUMERATION,
by W. G. Wisecup and B. G. Crouch. 20 June 62, 18p. (Rept. no. NRDL TR-569)
Unclassified report

DESCRIPTORS: *Blood, *Erythrocytes, *Pulse counters, Calibration, Electronic equipment, Counting methods, Tests.

AD-288 419 Div. 16
(TISTB/SAT) OTS price $2.60

University Coll., Cork (Eire).
STUDY OF THE PROPERTIES AND STRUCTURE OF PURIFIED MAMMALIAN ADENOSINE DEAMINASE ISOLATED FROM CALF INTESTINE.
Annual technical status rept. no. 1, 1 July 61-1 July 62,
by Thomas G. Brady. July 62, 23p.
(Contract DA 91-591-EUC-1831)
Unclassified report

DESCRIPTORS: *Amino acids, *Adenine derivatives, Enzymes.

AD-288 422 Div. 16
(TISTB/CCH) OTS price $1.60

Oxford U. (Gt. Brit.).
RESEARCH IN THE NEURAL MECHANISMS UNDERLYING PERCEPTION,
by David M. Vowles. 11 June 62, 17p. (Technical rept. no. 1)
(Contracts AF 61(052)420 and AF 61(052)114)
(AFOSR 3040) Unclassified report

DESCRIPTORS: *Nervous system, *Neuromuscular transmission, Behavior, Surgery, Perception.

AD-288 423 Div. 16
(TISTB/CCH) OTS price $1.60

London U. (Gt. Brit.).
FACTORS MODIFYING THE ACTION OF NEUROMUSCULAR BLOCKING AGENTS.
Final technical rept., 1 Apr 61-31 Mar 62,
by J. P. Payne. 31 Mar 62, 8p.
(Contract DA 91-591-EUC-1740)
Unclassified report

DESCRIPTORS: *Acetylcholines, *Nerves, *Neuromuscular transmission.

AD-288 424 Div. 16
(TISTB/SAT) OTS price $1.10

Copenhagen U. (Denmark).
(No title).
Annual progress rept., 1 May 61-30 Apr 62,
by Gunnar Thorson, Aage Moller Christensen, and Kurt W. Ockelmann. 30 Apr 62, 9p.
(Contract N62558-2905)
Unclassified report

DESCRIPTORS: *Marine biology, *Ocean bottom, Denmark, Aquatic animals.

AD-288 428 Div. 16
(TISTB/CCH) OTS price $1.10

Brooke Army Medical Center, Fort Sam Houston, Tex.
(No title).
Annual progress rept., 15 Sep 61-30 June 62,
by Virginia F. Harrison. 30 June 62, 8p. (Rept. no. MEDDH-288)
(Proj. 6X95-25-001)
Unclassified report

DESCRIPTORS: *Neuromuscular transmission, Motor reactions, Muscles, Control.

AD-288 432 Div. 16
(TISTB/SAT) OTS price $1.10

Aerospace Information Div., Washington, D. C.
SOVIET LITERATURE ON LIFE SUPPORT SYSTEMS.
3 July 62, 4p. (AID rept. no. 62-95; Trans. from Parin, V. V. and V. I. Yazdovskiy. Advances in Soviet space physiology. Fiziologicheskiy zhurnal SSSR, vol. 47, no. 10, pp. 1217-1226, Oct 61)
Unclassified report

DESCRIPTORS: *Space medicine, *Behavior, Respiration, Blood circulation, USSR, Dogs.

AD-288 435 Div. 16
(TISTB/CCH) OTS price $2.60

Lyons U. (France).
RESEARCH ON THE NEUROPHYSIOLOGICAL MECHANISMS OF SLEEP.
Technical final rept., Jan-Dec 61,
by Michel Jouvet. May 62, 24p.
(Contract AF 61(052)472)
(AFOSR 2886) Unclassified report

DESCRIPTORS: *Sleep, *Neurology, Electroencephalography, Nervous system, Laboratory animals, Behavior.

AD-288 438 Div. 16, 25
(TISTB/CCH) OTS price $5.60

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
TOWARD A PROPER LOGIC FOR PARALLEL COMPUTATION IN THE PRESENCE OF NOISE,
by Jack D. Cowan. 1960, 59p.
Unclassified report

DESCRIPTORS: *Information theory, *Neuromuscular transmission, Computers, Transmission, Mathematical analysis, Mathematical computer data, Noise, Mathematical logic.

AD-288 442 Div. 16
(TISTB/SAT) OTS price $1.60

Marine Lab., U. of Miami, Coral Gables, Fla.
THE GENERAL BIOLOGY OF TEREDO.
Final rept., 1954-1960,
by Charles E. Lane. 31 July 60, 10p. (Rept. no. 62-2; ML rept. no. 62054)
(Contract Nonr-84003, Proj. NR 104-271)
Unclassified report

DESCRIPTORS: *Aquatic animals, Mollusca, Physiology, Wood, Deterioration.

AD-288 443 Div. 16
(TISTB/SAT) OTS price $1.10

Valley Forge General Hospital, Phoenixville, Pa.
ANNUAL PROGRESS REPORT.

Rept. for 1 July 61-30 June 62,
by William G. Dunnington and William C. Hollifield. 30 June 62, 5p. (Rept. no. MEDDH-288)
(Proj. no. 6X97-87-001)
Unclassified report

DESCRIPTORS: *Tuberculosis, Military personnel, Isoniazid, Respiratory diseases, Therapy.

AD-288 444 Div. 16
(TISTB/SAT) OTS price $1.10

Chicago U. Medical School, Ill.
THE RELATIONSHIP OF BIOCHEMICAL AND ENZYMIC ABNORMALITIES OF CELLS TO RADIATION SUSCEPTIBILITY AND TO THEIR INJURY BY OTHER AGENTS (INCLUDING OBSERVATIONS ON THE SUSCEPTIBILITY OF PRIMAQUINE-SENSITIVE CELLS TO RADIATION).
Annual progress rept., 1 July 61-30 June 62,
by Paul E. Carson. 30 June 62, 5p.
(Contract DA 49-007-md-968)
Unclassified report

DESCRIPTORS: *Radiation effects, *Radioactive isotopes, Metabolism, Cells (Biology).

AD-288 445 Div. 16
(TISTB/SAT) OTS price $1.60

Tubingen U. (Germany).
ELECTROPHYSIOLOGICAL INVESTIGATIONS OF THE JOHNSTON ORGAN OF THE MALE MOSQUITO.
Final technical rept., 1 Aug 59-31 July 60,
by H. Tischner. 1 Aug 62, 15p.
(Contract DA 91-591-EUC-1248)
Unclassified report

DESCRIPTORS: *Mosquitoes, Sound, Germany, Insects, Hearing.

AD-288 446 Div. 16
(TISTB/CCH) OTS price $1.60

Springfield Coll., Mass.
EFFECT OF HEIGHT OF THE HEEL UPON THE FOOT,
by Benjamin Ricci and Peter V. Karpovich.
30 May 62, 9p.
(Contract DA 49-007-md-889)
Unclassified report

DESCRIPTORS: *Feet, *Shoes, Women, Goniometers, Military personnel, Anthropometry.

AD-288 448 Div. 16
(TISTB/SAT) OTS price $10.10

Washington U., Seattle. School of Medicine.
ANALYSIS OF RESPIRATORY CONTROL USING SINUSOIDALLY VARYING INSPIRED CARBON DIOXIDE.
Master's thesis,
by John Paul Thompson. 1962, 80p.
Unclassified report

DESCRIPTORS: *Respiratory system, Carbon dioxide, Physiology, Respiration, Control.

AD-288 451 Div. 16
(TISTB/SAT) OTS price $1.60

Naval Medical Research Lab., New London, Conn.
INTERACTION OF AEROSOLS AND AIR IONS,
by Karl E. Schaefer and James H. Dougherty.
29 Mar 62, 15p. (Rept. no. 380)
(Proj. MR005.14-3300-5.05)
Unclassified report

Reprinted from Proceedings of International Conference on Ionization of the Air, Oct 16-17, 1961.

DESCRIPTORS: *Ions, *Aerosols, *Physiology, Climatic factors, Submarines, Closed-cycle ecological systems, Particulate filters, Standards, Dosage, Determination.

AD-288 658 Div. 16
(TISTB/LMH) OTS price $14.50

Dugway Proving Ground, Utah.
A TENTATIVE LIST OF MALLOPHAGA FOR NORTH AMERICAN BIRDS (NORTH OF MEXICO),
by K. C. Emerson. 1 Aug 62, 217p.
Unclassified report

DESCRIPTORS: *Birds, *Parasites, *Classification, *Lice, North America, Indexes, Biology, Distribution.

A ready reference to the known species of Mallophaga (Chewing Lice) found on birds of North America (North of Mexico) is presented. Since Mallophaga are parasitic, distribution is entirely dependent upon the distribution of hosts, which in the case of many migratory birds is not limited to the New World. In other instances, certain New World birds are only subspecies of forms found elsewhere. Most records of North American Mallophaga published prior to 1945 were based on an outdated or inadequate classification, and without proper consideration for earlier European literature. In addition, there often was a tendency prior to that date to lump all forms that were congeneric, found on a particular group of birds, under one name. Remarkable progress in the taxonomy of Mallophaga has been accomplished in the last twenty-five years. More challenges in taxonomy remain today in Mallophaga, than probably in any other order of Insecta. Anyone contemplating a systematic study of the order is referred to Hopkins and Clay (1952) -- ''A check-list of the genera and species of Mallophaga'' and ''Additions.'' Their check-list is a good index to the known forms and the literature pertaining thereto. The classification contained therein, with few exceptions, is acceptable to all those actively studying the systematics of the order. (Author)

AD-288 659 Div. 16
(TISTB/LMH) OTS price $2.60

Dugway Proving Ground, Utah.
A TENTATIVE LIST OF MALLOPHAGA FOR NORTH AMERICAN MAMMALS (NORTH OF MEXICO),
by K. C. Emerson. 15 Aug 62, 20p.
Unclassified report

DESCRIPTORS: *Parasites, *Indexes, *Classification, *Lice, Mammals, Ticks, North America.

A ready reference to the known species of Mallophaga found on mammals of North America (North of Mexico) is presented. This classification for the Mallophaga is in accordance with Werneck (1948 and 1950)--'Os Malophagos de Mamiferos.''. A different generic classification is contained in Hopkins and Clay (1952)--'A check-list of the genera and species of Mallophaga'.' Classification for the mammals is from Miller and Kellogg (1955)--'List of North American Recent Mammals.' Published records of Mallophaga from mammal s ..are few in number, even for domestic

mammals. Hosts which are expected to have Mallophaga, but for which no records are known, are: arctic fox, swift fox, brown bear, grizzly bear, polar bear, fisher, otter, sea otter, jaguar, moose, caribou, pronghorn and musk ox. (Author)

AD-288 683 Div. 16
(TISTB/CCH) OTS price $2.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
METABOLIC AND THERMAL RESPONSES TO MUSCULAR EXERTION IN THE COLD,
by K. L. Andersen, S. Stromme, and R. W. Elsner. June 62, 26p. incl. illus. tables, 28 refs. (Rept. no. AAL TDR 61-52)
(Proj. 8240-19; In cooperation with Institute of Work Physiology, Blindern, Oslo, Norway, Grant no. AF-EOARDC 61-32)
Unclassified report

DESCRIPTORS: *Exposure, *Metabolism, *Exercise, Body temperature, Oxygen consumption, Blood circulation, Muscles, Heart, Physiology, Skin, Heat production (Biology).

The metabolic and thermal responses to muscular exertion in a cold environment were studied in outdoor and indoor workers. The metabolic rate in all subjects during exercise was higher in the cold environment than in the warm environment at low levels of work; at higher workloads it was the same. In the cold environment there was a tendency towards lower oxygen uptake of the outdoor workers than of the indoor workers at low levels of work; at high levels it was essentially the same. Differences in skin temperature and onset of rewarming indicate an adaptability to cold of the vasomotor control mechanism of the peripheral circulation. It is suggested that habituation to cold leads to a lower set point of the thermosensitive cells of the thermoregulatory center, so that vasodilation impulses are discharged at a lower temperature. (Author)

AD-288 684 Div. 16
(TISTB/CCH) OTS price $3.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
PHYSICAL FITNESS IN TERMS OF MAXIMAL OXYGEN INTAKE OF NOMADIC LAPPS,
by K. Lange Andersen, R. E. Elsner and others. June 62, 32p. incl. illus. tables, 25 refs. (Rept. no. AAL TDR 61-53)
(Proj. 8240-19; In cooperation with the Institute of Work Physiology, Oslo U., Norway, Grant no. AF-EOARDC-61-32) Unclassified report

DESCRIPTORS: *Exercise, *Oxygen consumption, Anthropometry, Blood, Experimental data, Norway, Physical fitness.

Physical fitness in terms of aerobic working capacity was measured in nomadic Lapps living in the northern part of the Scandinavian peninsula. Forty-nine men between 10 and 55 years of age and 21 girls were studied. Aerobic capacity was determined by measuring oxygen consumption during exercise on a bicycle ergometer. Two or three submaximal loads were used. The maximal work lasted three to four minutes, during which time the subjects worked as hard as they could. Blood lactate taken after this heavy run showed that the oxygen requirement exceeded oxygen intake, thus indicating that maximal values for oxygen intake were achieved during this type of exercise. The values for maximal oxygen intake of nomadic Lapps increased steadily from the age of 10 up to 18 years, from an average of 1.4 liters/minute to about 3.5 liters/minute. The latter value remained essentially unchanged up to the age of 30 in men. Maximum oxygen consumption then decreased to about 2.5 liters/minute at 50 years of age. No sex differences in maximum oxygen consumption were noted in subjects below 15 years of age. (Author)

AD-288 685 Div. 16
(TISTB/CCH) OTS price $2.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
INFLUENCE OF HYPOXIA ON THERMAL HOMEOSTASIS IN MAN,
by Thomas P. K. Lin and Ulrich C. Luft. June 62, 20p. incl. illus. tables, 12 refs. (Rept. no. AAL TDR 61-55)
(Proj. 8238-20; In cooperation with Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex., Contract AF 41(657)330)
Unclassified report

DESCRIPTORS: *Anoxia, *Stress (Physiology), Body temperature, Physiology, Metabolism, Respiration, Perspiration, Heart, Lungs, Man, Heat production (Biology), Temperature, Exposure.

The influence of induced hypoxia on core and shell temperatures, metabolic rate, perspiration and other related cardiopulmonary parameters was studied in six healthy subjects under neutral, cold and warm environmental conditions. Mean skin temperatures in all three thermal environments with room air breathing are not different from those in similar environmental conditions with hypoxia. It is concluded that a hypoxic level of tracheal PO2 = 65 mm Hg does not appreciably influence mean skin temperature in a neutral, cold, or warm environment. Rectal temperature during hypoxia is not different from that during room air breathing in neutral and cold environments. However, this is not true in a warm environment, when rectal temperature is significantly higher during hypoxia than that during room air breathing. The mechanism of this phenomenon cannot be explained on the basis of thermal balance alone. No great influence of hypoxia on shivering or perspiration can be detected under the experimental conditions. The synergistic actions of hypoxic and thermal stresses on total ventilation and heart rate are demonstrated. (Author)

AD-288 686 Div. 16
(TISTB/CCH) OTS price $1.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
THE EFFECT OF COLD EXPOSURE ON THE SURVIVAL OF MICE INOCULATED WITH VIABLE OR HEAT KILLED SALMONELLA TYPHIMURIUM,
by J. J. Previte and L. J. Berry. June 62, 13p. incl. illus. tables, 9 refs. (Rept. no. AAL TDR 62-2)
(Proj. no. 8241-32; In cooperation with Bryn Mawr College, Bryn Mawr, Pa., Contract AF 41(657)340)
Unclassified report

DESCRIPTORS: *Exposure, *Salmonella, Salmonella infections, Staphylococcus, Metabolism, Mice, Body temperature, Epidemiology, Infections, Viability, Survival, Heat, Laboratory animals..

Mice exposed to 5 C show an increased susceptibility to the lethal effects of Salmonella typhimurium, strain SR-11A, heat-killed S. typhimurium, or a relatively avirulent strain of Staphylococcus aureus Giorgio. This increase in susceptibility to infection at low environmental temperatures is masked in infections with a more virulent strain of viable S. typhimurium (SR-11). However, with lower doses of the latter, the 25 C

exposed mice are at least temporarily more successful in resisting the lethal effects of the disease. The differences in results between infection with SR-11 and SR-11A may be due to the genetic homogeneity and heterogeneity of the two respective cultures. Metabolic changes responsible for the increased susceptibility of the cold exposed animals remain to be investigated. (Author)

AD-288 689 Div. 16
(TISTB/CCH) OTS price $1.00

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
SOLAR ILLUMINATED PHOTOSYNTHETIC GAS EXCHANGERS,
by Robert B. Gafford and John D. Fulton. June 62, 30p. incl. illus. tables, 13 refs. (Rept. no. AAL TDR 62-36)
(Proj. 8241-23; In cooperation with Martin-Marietta Corp., Denver, Colo.)
Unclassified report

DESCRIPTORS: *Solar energy, *Algae, *Photosynthesis, *Closed- cycle ecological systems, *Gas diffusion, Gases, Space capsules, Space environmental conditions, Arctic regions, Man, Illumination .

A study was designed to determine if solar illuminated photosynthetic gas exchange systems would be feasible, and to provide sufficient data to determine if further consideration of this approach would be warranted. Comparative growth and photosynthetic data of two species of algae under various conditions are presented. Chlorella pyrenoidosa, strain TX 71105, and the 52 C strain of Synechococcus lividus were cultured in thin films in hemispherical domes and solar oriented flat panels during the long Alaskan days of June and July 1961. Growth and photosynthetic rates were measured in cultures having film depths of 1, 2 and 4 cm under solar illumination. The maximum production rate observed in the flat panels was over 50 grams of algae and approximately 100 liters (STP)of oxygen per square meter of illuminated surface per day. Based on the observed data, it is estimated that the illuminated area of algal suspension required for a one man gas exchanger will be six square meters or less. The maximum volume of the illuminator will be 60 liters. A small additional volume must be added for pumping and for gas exchange. (Author)

AD-288 690 Div. 16
(TISTB/LMH) OTS price $1.10

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
ALGAE FEEDING IN MICE: PRELIMINARY OBSERVATIONS,
by J. A. Rehkemper. June 62, 7p. incl. table, 5 refs. (Rept. no. AAL TDR 62-38)
(Proj. 8241-23)
Unclassified report

DESCRIPTORS: *Space medicine, *Algae, Laboratory animals, Histology, Tissues (Biology), Reproduction, Nutrition.

A study was designed to observe the effects on mice when fed Chlorella algae, cultivated in connection with a solar-illuminated closed algae system experiment, as the sole diet. Three males and two females under various breeding conditions and at various ages were maintained solely on algae from 10 to 21 weeks, mated, and observed. Detailed histologic studies were made on one male and its control, and comparative observations were conducted on the other male mice. The males failed to sire litters. Although, histologically, no significant changes were observed, using hematoxylin and cosin tissue preparations, and spermatogenesis appeared to be proceeding normally, the seminal vesicles were only one-quarter as large as, and lacked the texture of, those of controls of the same age. One experiment male, 7 1/2 months old, fed algae for five months, failed to sire although all four of its mates, never on algae, produced young when subsequently bred to nonexperiment males. (Author)

AD-288 692 Div. 16
(TISTB/CCH) OTS price $1.10

Colorado U. Medical Center, Denver.
(No title).
Final progress rept.,
by Joseph H. Holmes. 31 Mar 61, 3p.
(Contract DA 18-108-405-cml-264)
Unclassified report

DESCRIPTORS: *Cholinesterase, *Ophthalmology, *Insecticides, Medical examination, Blood chemistry, Atropine, Radioactive isotopes, Physostigmine, Acetylcholines, Membranes, Inhibition, Iodides, Toxicity.

Studies were made of the effect of administration of atropine in normal persons on blood composition, renal function and salivary flow. The effect of anticholinesterase agents on the rate of passage of Na24 across the blood brain barrier were completed. Data indicated that neither physostigmine or atropine altered significantly the rate of passage of Na24 across the blood brain barrier in rats and rabbits over the four-hour period studied. Measurements were made of the changes in plasma and extracellular volume produced by injection of physostigmine and acetylcholine and of the blocking effect of atropine. In vitro studies were done on changes in rate of transfer of radio-active isotopes across the red cell membrane after inhibition of red cell cholinesterase activity by anticholinesterase agents. This also included studies of the effects of blood storage on the red cell and plasma cholinesterase activity. Preliminary reports of the results were submitted. Investigations were also made of the changes in liver blood flow and BSP clearance produced by injection of physostigmine and acetylcholine in the unanesthetized dog. Additional experiments were performed in which atropine was administered prior to injection of physostigmine. (Author)

AD-288 781 Div. 16
(TISTM/EJH) OTS price $1.10

New York Medical Coll., N. Y.
DISTRIBUTION AND COMPOSITION OF SIALIC ACIDS AND GLYCOPROTEINS,
by Ward Pigman and Yohichi Hashimoto. 20 July 62, 8p. (Rept. no. 6)
(Contract DA-MD-49-193-62-G50)
Unclassified report

DESCRIPTORS: *Biochemistry, *Amino acids, *Proteins, *Mucus, Enzymes, Dogs, Cattle.

AD-288 806 Div. 16, 30
(TISTB/MD) OTS price $2.60

Buffalo U. School of Medicine, N. Y.
DETERMINATION OF DISSOLVED N2 IN BLOOD BY GAS CHROMATOGRAPHY AND (a-A)N2 DIFFERENCE,
by L. E. Farhi, A. W. T. Edwards, and T. Homma. 1962, 13p. illus. tables, 13 refs.
(Contract AF 33(616)6823)
Unclassified report

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DESCRIPTORS: *Nitrogen, *Chromatographic analysis, *Respiratory system, Lungs, Blood, Urine, Gases, Analysis, Diffusion, Man, Effectiveness.

The pioneering efforts of Klocke and Rahn have yielded a highly accurate method for the determination of the partial pressure of nitrogen in urine and established the fact that this measurement is a most reliable index of unevenness of ventilation-perfusion relationship in the lung. Unfortunately, the original analytical method is rather time-consuming and requires such a high degree of skill that it cannot be used for routine work. This paper describes a method which allows rapid and accurate determination of dissolved N2 in a reasonably small volume of blood. It consists of a single vacuum extraction in a modified Van Slyke apparatus and separation of the evolved gas in a gas chromatograph. The method has been developed primarily for the analysis of the nitrogen content of blood, but it has also been applied to analysis of distilled water and urine. A complete analysis requires less than ten minutes, and with practice, ten measurements can be obtained in one hour. The mean values for the arterial-alveolar nitrogen pressure difference using this new method are 7.2 mm Hg (blood analyses) and 9.4 mm Hg (urine analyses). The corresponding mean from the data of Klocke and Rahn on normal subjects is 8.3 mm Hg (based on urine analyses). (Author)

AD-288 829 Div. 16
(TISTB/CCH) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
A METHOD FOR RECORDING DEFORMATION IN DOUBLE PROCESSING OF DENTURE BASES,
by Allen A. Brewer, Lucian Szmyd and Clarence M. McCall, Jr. Aug 62, 7p. incl. illus. (Rept. no. SAM TDR 62-102)
(AFSC Proj. 7756)
Unclassified report

DESCRIPTORS: *Dentures, *Dentistry, *Deformations, *Recording devices, Instrumentation, Test methods.

A method is described for recording deformation in double processing of denture bases. The preliminary results obtained with this research method substantiate the clinical impression that relationship records for complete denture construction obtained on processed bases can be maintained until the dentures have been completed. (Author)

AD-288 876 Div. 16
(TISTB/LMH) OTS price $.50

Biomedical Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
DETERMINATION OF 1,1-DIMETHYLHYDRAZINE (UDMH) IN URINE.
Rept., Oct 60-July 62 on Toxic Hazards of Propellants and Materials,
by Philip Diamond and Anthony A. Thomas. Oct 62, 10p. incl. illus. tables, 10 refs.
(Proj. 6302)
(AMRL TDR 62-119) Unclassified report

DESCRIPTORS: *Methyl hydrazines, *Urine, Ferrites, Colorimetric analysis, Peroxides, Dose rate, Hydrogen compounds.

The colorimetric determination of 1,1-dimethylhydrazine (UDMH) in urine using trisodium pentacyanoamino ferroate (TPF) has heretofore been hampered by interfering substances in urine which resulted in poor recovery and some false negative results. A procedure was developed which overcame this difficulty and was primarily designed to determine rapidly in an emergency situation the urinary concentration of UDMH in exposed personnel. The procedure involves a hydrogen peroxide treatment of the urine followed by a colorimetric complexing of UDMH with TPF. In vivo results are presented on dogs that received intraperitoneal doses of UDMH with urinary concentrations of UDMH being determined in spontaneously voided and 24-hour pooled specimens. The results give some indication of the relationship of dose to excretion levels. In vitro recovery in 100 human urine specimens is presented. (Author)

AD-288 877 Div. 16
(TISTB/CCH) OTS price $.50

Biomedical Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
PHYSIOLOGICAL AND MECHANICAL RESPONSE OF THE HUMAN TO LONGITUDINAL WHOLE-BODY VIBRATION AS DETERMINED BY SUBJECTIVE RESPONSE.
Report on Biomechanics of Aerospace Operations,
by Edward B. Magid, Rolf R. Coermann and others. June 62, 13p. incl. illus. tables, 3 refs.
(Proj. 7231)
(MRL TDR 62-66) Unclassified report

DESCRIPTORS: *Vibration, *Stress (Physiology), Mechanical properties, Tissues (Biology), Frequency, Resonance, Reaction (Psychology), Stimulation, Physiology.

The production of symptoms in specific body regions to whole-body vibrations is dependent upon physiological alterations resulting from the mechanical stimulation of various organ-tissue complexes of the body. We investigated subjective response to gain an insight into the mechanical properties of the body. Fifteen subjects experienced with whole-body vibrations were included in a two-phase study in an attempt to measure qualitatively and quantitatively subjective response to longitudinal vibrations from 1 to 20 cps in a sitting position. In the first phase the complexity of body response to whole-body vibration was demonstrated since the subjects usually experienced several symptoms for each frequency tested. The second phase suggested that the sensations were resonance-dependent. Mechanical and physiological responses were correlated. (Author)

AD-288 884 Div. 16, 25
(TISTB/MS) OTS price $.50

Indiana U., Bloomington.
CALIBRATION OF THE INFRARED OPTOMETER.
Final rept., 1 May 61-31 Mar 62 on Physiology Research,
by Merrill J. Allen. Aug 62, 10p. incl. illus. tables.
(Contract AF 33(616)6146, Proj. 7163)
(AMRL TDR 62-88) Unclassified report

DESCRIPTORS: *Optometry, *Optical equipment, *Infrared optical systems, Test equipment, Calibration.

An infrared optometer for measuring the absolute status of accommodation is subject to a constant error not associated with chromatic aberration or changes in fixation. The reflections of infrared light within the eye cannot be considered to originate from the retina or pigment epithelium alone. Probably the choroid and sclera are involved giving a diffuse reflection and increased intraocular stray light. A schematic eye, using a retina of 2-mm. opalescent plexi-

glas with a sanded surface, approximately simulates the behavior of the human eye. Changes in fixation have only a slight effect on optometer accuracy as long as the pupil does not vignette the optometer beam. A modification is described for calibrating the infrared optometer for an individual subject without using trial lenses or a subjective optometer. (Author)

AD-288 905 Div. 16
(TISTB/CCH) OTS price $2.75

RCA Service Co., Inc., Camden, N. J.
TECHNIQUES OF PHYSIOLOGICAL MONITORING. VOLUME I. FUNDAMENTALS.
Final report on Biophysics of Flight,
ed. by Robert E. Barbiere, Raymond C. Baldwin and others. Sep 62, 120p. incl. illus. tables, 69 refs.
(Contract AF 33(616)7750, Proj. 7222)
(AMRL TDR 62-98, vol. 1)
Unclassified report

DESCRIPTORS: *Physiology, *Monitors, *Electronics, *Space medicine, *Handbook, Electronic equipment, Measurement, Medical equipment.

This volume is the first of a three-volume handbook covering the applications of electronics in monitoring bioelectric physiological responses. The fundamental concepts and methods presented in this volume form a foundation for the detailed technical discussions in the succeeding volumes and, it is hoped, provide a common language and basis of understanding between the physiologist and electronic engineer engaged in this field. The data obtained by monitoring physiological responses in varied environments can be used to improve the efficiency and increase the safety of a human subject in aircraft and spacecraft. (Author)

AD-289 023 Div. 16
(TISTB/MD) OTS price $.50

Armour Research Foundation, Chicago, Ill.
ENZYMATIC DIGESTION OF ALGAL CELLS.
Final rept., 1 Mar 61-31 Apr 62 on Space Biology Research,
by Maurice E. King and Alan M. Shefner. Aug 62, 9p. incl. illus. tables, 16 refs. (Rept. no. ARF 3139-5)
(Contract AF 33(616)7964, Proj. 7164)
(AMRL TDR 62-91) Unclassified report

DESCRIPTORS: *Algae, *Space flight, Man, Metabolism, Digestive system, Enzymes, Lysozyme, Proteases, Trypsin, Nutrition, Food.

Untreated algal cells are incompletely digested in man's alimentary canal. Therefore, various enzymes were investigated in an effort to develop an enzyme supplement that would increase the nutritive value of an algal ration. Such an enzyme additive would function by directly degrading the algal cells or by making the cells more susceptible to the action of the normal digestive enzymes. Enzymes were evaluated by in vitro digestion for 2 hours in artificial gastric juice followed by digestion for 4 hours in artificial intestinal juice. The commercial cellulases were not effective. Favorable results were obtained with enzyme systems derived from the snail Helix pomatia and the mold Myrothecium verrucaria. Pectinase was also effective, both alone and in combination with the snail and the mold enzymes. These results are consistent with the studies of Northcote and others on the composition of the algal cell wall. (Author)

AD-289 064 Div. 16
(TISTB/CCH) OTS price $2.60

Diamond Ordnance Fuze Labs., Washington, D. C.
ENGINEERING ANALYSIS OF THE ARMY ARTIFICIAL HEART PUMP (MODEL O)
by Henrik H. Straub. 29 Oct 62, 30p. incl. illus. 10 refs. (DOFL rept. no. TR-1090)
(Proj. 31000)
Unclassified report

DESCRIPTORS: *Artificial heart, Blood pressure, Instrumentation, Mathematical analysis, Blood circulation, Fluid flow, Effectiveness, Operation.

An initial engineering analysis was made of the Army Artificial Heart Pump, Model O. The analysis demonstrates that the pump's output varies directly with propelling and filling pressures and inversely with circuit resistances in a manner similar to that of the human heart. The systolic pressure amplitude and pulse duration of the pump's output pulses can be varied within fairly broad limits. It is determined that the heart pump, using 0.020-in. thick, 85-durometer, polyvinylchloride ventricles can satisfy the design requirements for human perfusion, although pulse rates are low at high loads. Ventricles of slightly greater stiffness are required to match more exactly cardiovascular characteristics. For animal perfusions, ventricles of much greater stiffness or perhaps a different design are required. The functional capabilities of the pump apart from the ventricle appear to be satisfactory. (Author)

AD-289 091 Div. 16
(TISTB/CCH) OTS price $1.50

Minneapolis-Honeywell Regulator Co., Minn.
LIFE SUPPORT SYSTEMS EVALUATOR INSTRUMENTATION.
Final rept., May 61-Feb 62 on Equipment for Life Support in Aerospace,
by E. E. Beson and M. P. Dickey. Aug 62, 52p. incl. illus. tables (Aero rept. no. 2662-TR2)
(Contract AF 33(616)8349, Proj. 6373)
(AMRL TDR 62-90) Unclassified report

DESCRIPTORS: *Monitors, *Control systems, *Space flight, Simulation, Humidity, Mathematical analysis, Recording systems, Space environmental conditions, Spaceships, Instrumentation.

The Life Support Systems Evaluator Console was built to monitor and record the changes in environmental parameters occurring during the test of men and life systems in an evaluator or space flight test chamber. The problems involved in furnishing the necessary instrumentation and displays were considered in a preliminary design investigation. The system design which evolved from the preliminary study embodies a four-module steel enclosure or console, with turret top section, work table surface, and rollaway table section, which contains the complete monitor system. The evaluator instrumentation includes sensors, indicators, and recorders which enable the investigators to monitor the following: absolute and differential pressures at six different stations in the test chamber, temperatures at 24 stations within the forward and aft sections of the chamber, relative humidity in forward and aft sections of the test chamber, analyses of chamber atmospheric composition, and continuous recording of the variables. (Author)

AD-289 257 Div. 16
(TISTB/CCH) OTS price $.50

Behavioral Sciences Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
WEIGHTLESS MAN: SINGLE-IMPULSE TRAJECTORIES FOR ORBITAL WORKERS.
Final rept. on Human Performance in Advanced Systems,
by Donald D. Mueller and John C. Simons. Sep 62, 9p. incl. illus. table, 2 refs.
(Proj. 7184)
(AMRL TDR 62-103) Unclassified Report

DESCRIPTORS: *Space flight, *Weightlessness, *Maintenance personnel (Orbital workers), Maintenance, Job analysis, Mathematical analysis.

While performing maintenance and assembly tasks outside of space vehicles under weightless conditions, a worker may accidentally propel himself away from his vehicle. To determine the speed of such a single-impulse launch, subjects under weightless conditions in a zero-G KC-135 aircraft propelled themselves away from a surface with their legs. They attained maximum velocities of approximately 10 mph. Using various launch speeds and directions, theoretical trajectories have been projected for both coplanar and noncoplanar launches. These trajectories indicate that any launch having a velocity component parallel to the direction of orbital motion will result in a trajectory such that the worker will never return to his vehicle. (Author)

AD-289 272 Div. 16, 30
(TISTB/MD) OTS price $.50

Biomedical Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
ULTRA MICRO PROCEDURE FOR UDMH IN BLOOD.
Final rept. for Sep-Dec 61 on Toxic Hazards of Propellants and Materials,
by Mildred K. Pinkerton and Anthony A. Thomas. Oct 62, 4p. ref.
(Proj. 6302)
(AMRL TDR 62-120) Unclassified report

DESCRIPTORS: *Methyl hydrazines, Serum, Blood plasma, Colorimetric analysis.

An ultra micro procedure for the determination of 1,1-dimethylhydrazine (UDMH) in blood is described. The method uses 25 microliters of serum or plasma which can be collected as capillary blood in micro hematocrit tubes and does not require deproteinization. The color reaction between UDMH and trisodium pentacyanoamino ferroate (TPF) occurs after direct treatment of the serum sample. The selection of normal commercially available control serum as a suitable blank is also discussed. (Author)

AD-289 276 Div. 16
(TISTB/MD) OTS price $1.10

National Institutes of Health, Bethesda, Md.
ANIMAL FACILITIES PLANNING, DESIGN, AND CONSTRUCTION EXCLUDING GERMFREE OF SPF FACILITIES. SELECTED REFERENCES, 1938-1962,
comp. by Gertrude Fox. 1962, 5p. 56 refs.
Unclassified report

DESCRIPTORS: *Bibliography, *Laboratory equipment, *Laboratory animals, Housing.

AD-289 285 Div. 16
(TISTB/CCH) OTS price $3.60

School of Aerospace Medicine, Brooks Air Force Base, Tex.
MECHANISMS OF HYPERVENTILATION IN MAN. CARBON DIOXIDE AND ACID-BASE TRANSIENTS DURING HYPERVENTILATION. RECOVERY FROM ACUTE HYPERVENTILATION,
by Joseph F. Tomashefski, Earl T. Carter, and Joseph A. Lipsky. June 62, 31p. incl. illus. tables, 17 refs. (Rept. nos. 62-52 and 62-53)
Unclassified report

DESCRIPTORS: *Polypnea, *Carbon dioxide, *Oxygen poisoning, Respiration, Anoxia, Tissues (Biology), Lungs, Arteries, Blood, Acid-base equilibrium, Physiology.

Studies were conducted on ten healthy adult males subjected to mechanically induced hyperventilation. Total ventilation was increased approximately 300%. This resulted in a mean arterial CO_2 tension decrease to 20 mm. Hg and a mean pH increase to 7.60. Observations of the dynamic shifts in CO_2 stores were made for a 12-minute period after the onset of hyperventilation. The total CO_2 elimination was determined and compared to the basic metabolic CO_2 production to permit estimation of body CO_2 depletion. In a second experiment 14 male subjects were mechanically hyperventilated by intermittent positive-pressure breathing. Tidal volume and respiratory frequency were increased approximately three times and one and one-half times control, respectively. Expired air was monitored continuously, and arterial blood was collected frequently during 12-minute periods of hyperventilation and recovery. Breath-by-breath analyses indicate a loss of approximately 2.5 liters of CO_2 from the body stores during hyperventilation. Only 1/3 of that volume was restored during the ensuing recovery period, mostly as a result of hypoventilation rather than apnea. Over the entire recovery period, the volume of CO_2 regained by the arterial blood represented approximately 75% of the CO_2 content lost during hyperventilation. (Author)

AD-289 286 Div. 16, 30
(TISTB/LMH) OTS price $1.60

School of Aerospace Medicine, Brooks Air Force Base, Tex.
SAM CONTOURATOR, MODEL B - AN INSTRUMENT FOR MEASURING CHANGES OF SURFACE CONTOURS,
by Lucian Szmyd, Carlos F. Schuessler and others. Aug 62, 10p. incl. illus. table, 10 refs. (Rept. no. SAM TDR 62-93)
(Proj. 7756)
Unclassified report

DESCRIPTORS: *Dental equipment, Dentistry, Dental surgery, Prosthetics, Teeth, Surface properties, Instrumentation.

The SAM Contourator is an instrument developed to record topographic changes of the residual ridges after tooth extraction and to reveal dimensional behavior of dental materials. Model B, a modification of model A, reduced the procedural requirements of the instrument by allowing for easier and more rapid recording. The pantographic apparatus magnifies the area under study. The contour arm of the machine and the articulator are more flexible and permit easier approach by the operator. (Author)

Division 16 - MEDICAL SCIENCES

AD-289 287 Div. 16
(TISTB/CCH) OTS price $1.60

School of Aerospace Medicine, Brooks Air Force Base, Tex.
EFFECTS OF CHANGES IN BLOOD Pco2 ON BRAIN OXYGENATION AT 147 mm HG AMBIENT PRESSURE (39,000 FEET),
by E. C. Pierce, Jr., C. J. Lambertsen and others. June 62, 16p. incl. illus. tables, 51 refs. (Rept. no. SAM TDR 62-70)
(Proj. 7756; In cooperation with Pennsylvania U. School of Medicine, Philadelphia, Contract AF 41(657)16)
Unclassified report

DESCRIPTORS: *Oxygen poisoning, Blood circulation, Brain, Oxygen consumption, Pressure, Alkalosis, Respiration, Hydrogen ion equilibrium, Acid-base equilibrium, Chemoreceptors.

Hyperventilation during the breathing of 100% oxygen elevates the oxygen tension of alveolar gas by the same amount that it lowers its CO2 tension. Since the development of arterial hypocapnia causes cerebral vasoconstriction, brain oxygenation is drastically decreased even while arterial oxygenation is improved by the hyperventilation. Administration of 30% CO2 with oxygen at an ambient pressure equivalent to that at 39,000 feet altitude prevented alkalemia and, in spite of hyperventilation, restored central oxygenation to a level at least equivaleat to that found when pure oxygen was breathed at rest at the same altitude. The respiratory minute volume during administration of CO2 with O2 was greater than when O2 alone was breathed at the reduced ambient pressure. Since neither arterial oxygen tension nor central CO2 tension values differed in these two experimental situations, the respiratory stimulation may represent the quantitative demonstration in man of a respiratory effect of carbon dioxide which is mediated solely by the chemoreceptors exposed to arterial blood and which acts in the absence of a change in direct central stimulation by CO2. (Author)

AD-289 314 Div. 16, 25
(TISTB/LMH) OTS price $1.60

Michigan U., Ann Arbor.
ATTENDANCE AT EUROPEAN CONFERENCES ON ACOUSTICS AND SPEECH.
Rept. for 16 Aug-14 Sep 62,
by Gordon E. Peterson and June E. Shoup.
10 Oct 62, 16p.
(Contract AF 49(638)492 and Grant B-2444)
Unclassified report

DESCRIPTORS: *Speech, *Conferences, *Acoustics, Otorhinolaryngology, Audiofrequency, Analysis, Synthesis, Speech transmission, Underwater sound, Noise analyzers, Hearing, Europe.

AD-289 515 Div. 16, 30
(TISTB/MD) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
A MICRO METHOD FOR MEASURING CHOLESTEROL UPTAKE,
by Dale A. Clark and Carrie B. Haven. Aug 62, 6p. incl. illus. tables, 7 refs. (Rept. no. SAM TDR 62-84)
(Proj. 7753)
Unclassified report

DESCRIPTORS: *Cholesterol, Serum, Determination.

A method has been devised by which the cholesterol uptake of serum can be measured on volumes as small as 1.2 ml. Equipment by which this procedure can be carried out is described. Key to the use of the small volumes is a flexible plastic incubation chamber and a unit in which filtration, centrifugation, and pipetting can be carried out without the necessity of transferring the filtrate to another vessel. The equipment is useful for other laboratory procedures which involve filtration of small volumes. The procedure used in micro measurement of cholesterol uptake is described. (Author)

AD-289 516 Div. 16, 28
(TISTB/LMH) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
IDENTIFYING THE OVERLY ANXIOUS PATIENT IN IMPACTED THIRD MOLAR SURGERY,
by Earl H. Cramer and Lucian Szmyd. July 62, 5p. incl. table, 25 refs. (Rept. no. SAM TDR 62-90)
(Proj. 7756)
Unclassified report

DESCRIPTORS: *Dental surgery, *Surgical trauma, Psychiatry, Personality, Attitudes, Behavior, Identification, Neuropsychiatry, Anxiety.

Study was made of personality factors responsible for anxiety in individuals with impactions, in order to provide an effective method for identifying the patients most likely to be difficult during surgery. The personalities of 26 postoperative impaction patients were studied by means of psychiatric interview. Psychiatric data were scored in two ways. Results of one of the scoring methods had a significant correlation with the dental investigator's independent rating of the degree of cooperativeness during surgery. Characteristic of hyperreactive patients was a past history of dental or medical trauma-as shown by case studies. It is concluded that, by specific inquiry about past dental and medical trauma, many of the difficult surgical patients can be identified in advance. (Author)

AD-289 517 Div. 16
(TISTB/CCH) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
LABORATORY PERFORMANCE OF LOW CONCENTRATION AQUEOUS STANNOUS FLUORIDE PROPHYLAXIS PASTES,
by Ira L. Shannon and Warren R. Hester. Sep 62, 3p. incl. tables, 5 refs. (Rept. no. SAM TDR 62-92)
(Proj. 7756)
Unclassified report

DESCRIPTORS: *Dentistry, *Dentine, Silicones, Fluorides, Tin compounds, Teeth, Test methods.

Aqueous stannous fluoride solutions were added to silex, and the ability of the resulting prophylaxis pastes to prevent in vitro enamel decalcification was tested. Both the 10 and the 20% stannous fluoride solutions were significantly more effective than the 5 and the 1% preparations. In experiments with 10% aqueous stannous fluoride added to silex and to flour pumice as abrasives, protection ranged from 64.3 to 76.6%. In experiments ranging from 4 to 22 weeks in length, no deleterious effects of age were found. (Author)

AD-289 518 Div. 16
(TISTB/CCH) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
STRESS IN DENTAL PATIENTS. EFFECT OF TIME OF DAY ON THE ADRENOCORTICAL RESPONSE TO ORAL SURGERY,
by Ira L. Shannon and Gerald M. Isbell. Aug 62, 4p. incl. illus. table, 23 refs. (Rept. no. SAM TDR 62-95)
(Proj. 7756)
Unclassified report

DESCRIPTORS: *Stress (Psychology), *Denistry, *Conditioned reflex, Dental surgery, Corticosteroids, Excretion, Steroids, Urinary tract, Time, Anxiety.

The effect of time of day on the serum 17-hydroxycorticosteroid response was studied in 120 healthy adult males undergoing oral surgery. Urinary steroid excretion studies were carried out on an additional 117 comparable subjects. The anticipation of tooth removal was again found to produce significantly increased serum steroid concentrations. The diurnal effect produced a significant decrease in serum 17-OHCS levels in these apprehensive patients when surgery was delayed until later in the day. The capacity of the cortex to respond to the exodontic procedure was not decreased by delaying the operation until 1300 hours. The mean serum steroid concentration at 1300 hours, just prior to surgery, was virtually identical to out values found for 633 nonoperated control subjects at 0730 to 0800 hours. The effect of the exodontic procedure on urinary steroid excretion was not positively established. (Author)

AD-289 519 Div. 16
(TISTB/CCH) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
THE LIPID CONSTITUENTS OF WHOLE AND PAROTID SALIVA,
by Thomas R. Dirksen. Aug 62, 4p. incl. illus. 15 refs. (Rept. no. SAM TDR 62-111)
(Proj. 7756)
Unclassified report

DESCRIPTORS: *Dentistry, *Lipids, *Saliva, Salivary glands, Fatty acids, Phospholipids, Cholesteryl esters, Chromatographic analysis.

Chloroform: methanol extracts of whole and parotid saliva were subjected to paper chromatography to further characterize their lipid components. The presence of cholesterol esters, triglycerides, fatty acids, cholesterol, diglycerides, monoglycerides, and various phospholipids was demonstrated in the sample materials. Whole and parotid saliva had similar nonphosphatides, but differed in their phospholipid composition. (Author)

17. METALLURGY

AD-287 933 Div. 17, 22
(TISTP/WH) OTS price $1.60

Watervliet Arsenal, N. Y.
THERMAL STRESSES IN JACKETED TUBES,
by C. D. Sutherland and R. E. Weigle. Sep 62, 17p. incl. illus. 2 refs. (Rept. no. WVT-RR-6207)
(DA Proj. 50101033)
Unclassified report

DESCRIPTORS: *Thermal stresses, *Gun tubes, *Tensile properties, *Cylinder liners, Stresses.

The effect of thermal stress was analyzed for the case of a shrink-fit operation involving a restraining shoulder in the jacket and the liner, and the point of initial shrinkage was not at the shoulder. Consideration is given to the possibility of slippage between the jacket and the liner. A numerical example was worked out for the 120mm gun tube. (Author)

AD-287 962 Div. 17, 25
(TISTM/BRW) OTS price $.75

Weibull, Waloddi, Bockamollan (Sweden).
THE EFFECT OF SIZE AND STRESS HISTORY ON FATIGUE CRACK INITIATION AND PROPAGATION.
Rept. for Sep 60-Sep 61 on Metallic Materials,
by Waloddi Weibull. Aug 62, 23p. incl. illus. tables, 8 refs.
(Contract AF 61(052)522, Proj. 7351)
(ASD TDR 62-785) Unclassified report

DESCRIPTORS: *Aluminum alloys, *Fracture (Mechanics), Theory, Propagation, Sheets, Stresses, Fatigue (Mechanics).

Geometrically similar sheet specimens of 2 different Al alloys were subjected to variousload cycles. It was found that each size had its individual S-N sub i curve, considerably differing from those of other sizes. A reduction to one and the same size by means of the Neuber stress concentration factor K sub N was only partially successful. A static preload was found to increase the value of N sub i from 11 kc to 205 kc. Equations relating crack length to number of cycles are derived for two alternatives: constant stress cycle and constant load cycle applied to a sheet specimen. It was found that the rate of crack growth is constant after a transition period had been passed. The duration of this period is dependent on the duration of the preceding initiation period. For small values of N sub i it does not even exist. Also, a convenient method for interpreting the results was obtained by plotting crack length vs. number of cycles. It was found that the propagation period starts with a transition period, followed by 1, 2, or even 3 stable propagation periods, the number depending on the magnitude of the applied load. An examination of the broken specimens showed that these periods correspond to different fatigue mechanisms. It is concluded that total fatigue life cannot be predicted without considering separately the parts of which it is composed. (Author)

AD-287 984 Div. 17, 26
(TISTM/EJH) OTS price $1.10

Oregon Metallurgical Corp. Albany.
EVALUATION OF MOLYBDENUM METAL PRODUCED BY THE TIN REDUCTION OF MOLYBDENUM DISULPHIDE PROCESS.
Quarterly rept. no. 2, 13 July-13 Oct 62, 13 Oct 62, 5p.
(Contract NOw 62-0754-c)
Unclassified report

DESCRIPTORS: *Molybdenum, Molybdenum compounds, Sulfides, Oxides, Reduction, Processing, Hydrogen, Hydrochloric acid, Acetones, Tin, Carbon, Impurities, Production.

An unusually high fixed carbon was found in Grade I Climax molybdenite. This carbon was successfully removed by roasting in wet hydrogen at 800 C. The roasting process also made a

contained iron fraction amenable to further removal by hydrochloric acid leaching. A substantial quantity of molybdenum oxide soluble in acetone was found after acid leaching and was presumed to be ''Molybdenum Blue'' so the molybdenite was acetone leached and dried. Analyses on molybdenite processing are imcomplete at this time and will be included in the next quarterly report. (Author)

AD-288 090 Div. 17
(TISTM/TCG) OTS price $1.60

Army Materials Research Agency, Watertown, Mass.
POLAR MODEL OF ORDERING ENERGY IN ALLOYS,
by Ralph J. Harrison and Arthur Paskin. Sep 62, 9p. incl. table, 13 refs. (MRL rept. no. 123)
(Proj. DA 593-32-007)
Unclassified report

DESCRIPTORS: *Brass, *Copper alloys, *Molecular association, *Energy, Electrons, Conductivity, Electron charge, Alloys, Zinc alloys, Solid state physics, Theory, Test methods.

The origin of the ordering energy in binary alloys is discussed in relation to the development of the polar model by N. F. Mott (Proc. Phys. Soc. (London) v. 49, 1937:258). Mott discussed this model with particular reference to the ordered beta brass (Cu Zn) alloy. The polar model is briefly described. (Author)

AD-288 124 Div. 17
(TISTM/ODN) OTS price $1.10

New York U. Coll. of Engineering, N. Y.
(No title)
Status rept. no. 19, 1 July-31 Aug 62,
by Ralph Papirno. 31 Aug 62, 2p. incl. table, 2 refs.
(Contract NOw 62-0176d)
Unclassified report

DESCRIPTORS: *Alloys, *Titanium alloys, Vanadium alloys, Chromium alloys, Aluminum alloys, Failure (Mechanics), Tensile properties.

Notched tensile specimens of aged beta Ti alloy (Ti-13V-11Cr-3Al) were tested to failure. Specimens were of the internal notch type with elastic concentration factors which varied from 4.0 to 9.8. Ultimate strength data are presented in tabular form. (Author)

AD-288 127 Div. 17, 26
(TISTM/BRW) OTS price $1.25

Defense Metals Information Center, Columbus, Ohio.
DEPARTMENT OF DEFENSE REFRACTORY METALS SHEET-ROLLING PROGRAM.
Status rept. no. 2,
by H. R. Ogden. 15 Oct 62, 36p. incl. illus. tables (DMIC rept. no. 176)
(Contract AF 33(616)7747)
Unclassified report

DESCRIPTORS: *Refractory materials, *Heat resistant alloys, *Sheets, Niobium alloys, Molybdenum alloys, Tantalum alloys, Tungsten alloys, Titanium alloys, Zirconium alloys, Tungsten, Powder metallurgy, Electric arcs, Manufacturing methods, Mechanical properties, Forging, Heat treatment, Melting, Extrusion, Deformation, Hardness, Rolling mills, Processing.

The Nb program is nearing completion of laboratory rolling studies, and a single composition for larger scale rolling studies will be selected in the near future. In the Mo program, it has been shown that true hot forging of billets to sheet bar results in higher recrystallization temperatures of TZM and Mo-0.5Ti sheet than are obtained when normal forging temperatures are used. The Ta program is in the early stages of ingot production and primary breakdown fabrication of the Ta-30Nb-7.5V alloy. Three methods of fabricating W sheet are being investigated: rolling of powder-metallurgy billets, fabrication of arc-melted ingots, and floturning of cylindrical blanks. Properties obtained on both powder-metallurgy and arc-melted tungsten sheet compare very favorably. Evaluation of the formability of Mo-alloy sheet has been delayed until sheet is available from the production program. (Author)

AD-288 286 Div. 17, 26
(TISTM/BRW) OTS price $4.60

North American Aviation, Inc., Columbus, Ohio.
DOD HIGH STRENGTH TITANIUM ALLOY SHEET RESEARCH PROGRAM.
Final rept.,
by J. A. Lumm and D. E. Myers. 28 Sep 62, 40p. incl. illus. tables, refs. (Rept. no. NA57H-527-19)
(Contract NOa(s) 57-785d)
Unclassified report

DESCRIPTORS: *Titanium alloys, *Sheets, Aluminum alloys, Tin alloys, Zirconium alloys, Creep, Tensile properties, High temperature research, Welds, Temperature, Deformation, Stresses, Alloys, Mechanical properties.

The report contains creep properties for times up to 1000 hours and deformations up to 1.0% for both the 5Al-5Sn-5Zr and 7Al-12Zr alloys at 900 and 1100 F. Tensile properties at room temperature of creep specimens which did not fail during testing are presented for both alloys and compared with room temperature unexposed material properties. Both alloys maintain excellent resistance to creep at 900 F. At 1100 F there is a considerable drop in creep properties when compared with the percentage drop in tensile properties. There is some difference in creep properties of the two alloys and embrittlement of the 7Al-12Zr alloy is more severe than the 5Al-5Sn-5Zr alloy. (Author)

AD-288 515 Div. 17, 30
(TISTM/BRW) OTS price $1.50

Michigan U., Ann Arbor.
STRAIN DISTRIBUTION ON NOTCHED PLATE SPECIMENS AT CREEP TEMPERATURES.
Rept. for 1 July 60-31 Dec 61,
by Howard R. Voorhees and James W. Freeman.
Aug 62, 50p. incl. illus. tables, 11 refs.
(Contract AF 33(616)7416, Proj. 7381)
(ASD TDR 62-710) Unclassified report

DESCRIPTORS: *Metals, Measurement, Test methods, Test equipment, Strain gages, Metal plates, Deformation, Extensometers, X-ray diffraction analysis, Photoelasticity, Aluminum alloys, Sheets, Rupture, Temperature, Creep, Stresses.

Resistance strain gages and grids of vapor-deposited metal were evaluated for measuring strains at loading and during creep in plates with edge notches. Foil strain gages mounted with thermal-setting cements remained usable to 0.5% or higher strain at 500 F, but indicated creep was first less than, and later more than, optical-extensometer readings. Indications from gages mounted with ceramic cement drifted 10 mu

in./in./hr at 1200 F after several hundred hours at temperature, but agreed with the extensometer to one per cent strain. Qualitative measurements were made during loading (K sub t 1.8 and 3.6) and for creep (K sub t 1.8) of M-470 alloy at 500 F. Plastic strains were too small to determine by the grid lines used. (Author)

AD-288 523 Div. 17, 26
(TISTM/BRW) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
EFFECT OF ELECTROSLAG REMELTING OF HIGH ALLOYED STEEL AND ALLOYS ON THE REMOVAL OF NON-METALLIC INCLUSIONS,
by M. M. Klyuyev and V. V. Topilin. 10 Oct 62, 13p. incl. illus. tables, 11 refs. (Trans. no. FTD-TT 62-1249, from Izvestiya Vysshikh Uchebnykh Zavedeniy, Chernaya Metallurgiya, No. 1, pp 78-89 1962)
Unclassified report

DESCRIPTORS: *Steel, *Alloys, Slags, Electric arcs, Stainless steel, Heat resistant alloys, Steel electrodes, Purification, USSR, Controlled atmospheres, Processing, Melting.

The purification of steel by electroslag remelting was dependent upon the degree of oxidation of consumable electrodes during melting. The use of nitrogen, argon, as well as a lid on the crystallizer to protect the surface of the melted slag and the tip of the electrode reduced the inclusion of nonmetallic contamination as well as globular metal inclusions which would oxidize readily by contact with atmospheric oxygen. The composition of the slag had little effect on the quantity of nonmetallic inclusions in remelted stainless steel SHKH15SG.

AD-288 525 Div. 17
(TISTM/BRW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
HYDROGEN BRITTLENESS OF STEEL (ACID BRITTLENESS),
by P. S. Moroz and T. E. Mingin. 15 Oct 62, 7p. incl. illus. (Trans. no. FTD-TT 62-1242, from Metallovedeniye I Termicheskaya Obrabotka Metallov, No. 4, pp. 2-6, 1962)
Unclassified report

DESCRIPTORS: *Steel, Hydrogen, Diffusion, Deformation, Stresses, USSR, Mechanical properties, Hydrogen embrittlement.

AD-288 557 Div. 17, 1
(TISTM/ODN) OTS price $2.60

General Dynamics/Fort Worth, Tex.
MATERIAL - STEEL, ALUMINUM, BRONZE - COMBINED GALVANIC, STRESS CORROSION OF,
by E. W. Turns. 26 Oct 62, 19p. incl. illus. tables (Rept. no. FGT-2939)
(Contracts AF 33(600)41891 and AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Landing gear, *Stresses, *Metals, Materials, Steel, Moisture, Sea water, Sprays, Greases, Absorption, Coatings, Films, Aluminum, Airplanes, Tests, Electric potential, Beams, Strain gages, Manganese alloys, Alloys, Bronze, Corrosion.

Tests were conducted to determine what effects the various dissimilar materials in the landing gear have on accelerated stress corrosion of the landing gear axle material, 4340 steel. Based on test results the following conclusions were made: water absorption by the various landing gear greases was virtually equal with a 200 to 300% increase over the amount present in the grease; and the combined galvanic effect of the dissimilar metals in the landing gear fail area does not increase stress corrosion of 260-292 KSI Ftu 4340 steel when tested in a 20% salt spray accelerated stress corrosion environment. (Author)

AD-288 611 Div. 17, 4, 25, 26
(TISTM/AJM) OTS price $7.60

Oklahoma State U., Stillwater.
AN INVESTIGATION OF SOME NONDESTRUCTIVE TEST METHODS.
Master's thesis,
by William Calvin Diehl, Jr. May 62, 65p. incl. illus. tables, 47 refs.
Unclassified report

DESCRIPTORS: *Non-destructive testing, *Radiography, *Fluorescent dyes, *Flash welds, *Radioactive isotopes, Theses, Welds.

A partial survey of nondestructive testing methods was made. This survey included penetrant inspection, radiography, magnetic particle inspection, ultrasonic inspection, and eddy current inspection. A comparison of the brightness and contrast of several fluorescent penetrants was made using a photoelectric photofluorometer. An attempt was made to develop a method for the radiographic inspection of circumferential flash-welds in small steel cylinders using radioisotopes as the source of penetrating radiation. (Author)

AD-288 705 Div. 17
(TISTM/TCG) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE HYDROGEN BRITTLENESS OF IRON-CHROMIUM ALLOYS AS A FUNCTION OF THE TEMPERATURE AND THE TESTING RATE,
by V. A. Yagunova and K. V. Popov. 8 May 62, 11p. (Trans. no. FTD-TT-62-444 from Fizika metallov i metallovedeniye, vol. 12, no. 2, pp. 176-182, 1961)
Unclassified report

DESCRIPTORS: *Iron alloys, *Chromium alloys, *Hydrogen embrittlement, Alloys, Temperature, Test methods, USSR, Plasticity, Deformation.

AD-288 711 Div. 17
(TISTM/TCG) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
METHOD OF INCREASING PLASTICITY OF PALLADIUM ALLOYS WITH HIGH TUNGSTEN CONTENT,
by V. S. Mes'kin, L. A. Popova and others. 13 June 62, 3p. (Trans. no. FTD-TT-62-780 from Patent 139450, appl. nr. 675014/22, Sposob Povysheniya Plastichnosti Splavov Palladiya S Vysokim Soderzhaniyem Volframa, 30 July 60)
Unclassified report

DESCRIPTORS: *Palladium alloys, *Plasticity, Tungsten alloys, Test methods, Heat treatment, Degasification, Vacuum systems, Alloys, USSR.

AD-288 713 Div. 17
(TISTM/TCG) OTS price $10.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
NEW METHODS OF CRUSHING OF ROCKS (Novyye Metody

Razrusheniya Gornykh Porod),
by Ye. F. Epshteyn, E. I. Arsh, and G. K. Vitort.
19 June 62, 131p. (Trans. no. FTD-TT-62-122 from Gosudarstvennoye Nauchno-Tekhnicheskoye Izdatel'stvo Neftyanoy i Gorno-Toplivnoy Literatury, Moskva, pp. 1-87, 1960)
Unclassified report

DESCRIPTORS: *Ores, *Minerals, *Drilling machines, Coal, Petroleum, Construction, Hydraulic systems, Industrial equipment, Test methods, USSR.

AD-288 717 Div. 17
(TISTM/TCG) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INVESTIGATING THE STATE OF A SOLID SOLUTION OF AN E1437A ALLOY DURING AGING,
by M. P. Arbuzov and M. I. Gitgartz. 16 May 62, 12p. (Trans. no. FTD-TT-62-509 from Fizika Metallov I Metallovedeniye, vol. 11, No. 4, pp. 568-574, 1961)
Unclassified report

DESCRIPTORS: *Nickel alloys, *Solids, X-ray diffraction analysis, Decomposition, Reaction kinetics, Lattices, Hardness, USSR, Aging, Solutions.

AD-288 718 Div. 17
(TISTM/ODN) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
TEMPER BRITTLENESS OF STEEL,
by L. M. Utevskiy. 22 May 62, 12p. (Trans. no. FTD-TT-62-513 from Metallovedeniye I Termicheskaya Obrabotka Metallov, No. 6, pp. 35-41, 1961)
Unclassified report

DESCRIPTORS: *Steel, Alloys, Phosphorus alloys, Iron alloys, Carbon alloys, Chemical analysis, Heat treatment.

AD-288 726 Div. 17, 26
(TISTM/EJH) OTS price $2.60

General Dynamics/Fort Worth, Tex.
PROCESS - ALUMINUM CLEANING FOR ADHESIVE BONDING - INVESTIGATION OF.
Rept. for 1 Oct 56-15 Oct 57,
by L. E. Weltman. 1 June 62, 22p. (Rept. no. FGT-1903)
(Contract AF 33(600)32841)
Unclassified report

DESCRIPTORS: *Aluminum, *Aluminum alloys, *Bonded joints, Surfaces, Cleaning, Solutions, Dichromates, Chromates, Adhesives, Bonding.

AD-288 750 Div. 17
(TISTM/TCG) OTS price $1.10

Aerospace Information Div., Washington, D. C.
SOVIET HIGH-STRENGTH STEELS.
29 June 62, 2p. (AID rept. no. 62-86; Trans. from Alekseyenko, M. F. Struktura i svoystva teplostoykikh konstruktsionnykh i nerzhaveyushchikh staley (Structure and properties of heat-resistant structural and stainless steels). Moskva, Oborongiz, 215p. 1962)
Unclassified report

DESCRIPTORS: *Steel, *Heat resistant alloys, *Stainless steel, Alloys, Austenite, Nitration, Mechanical properties, Hardening, USSR.

AD-288 898 Div. 17, 26, 30
(TISTM/BRW) OTS price $1.60

Naval Research Lab., Washington, D. C.
ULTRASONIC INSPECTION OF TUNGSTEN ROUND ROBIN BILLETS, PHASE I,
by Stephen D. Hart and Louis C. Cardinal.
29 Oct 62, 17p. incl. illus. (Technical memo. no. 214)
(Proj. 62R05-19B)
Unclassified report

DESCRIPTORS: *Tungsten, Test methods, Ultrasonics, Test equipment, Transducers, Density, Moistureproofing, Coatings, Quality control.

Ultrasonic inspection of the Tungsten Round Robin billets (Phase I) was completed. Tests conducted were primarily to determine: (1) best transducer frequency, (2) method of waterproof wrapping of uninfiltrated billets for immersed inspection, (3) velocity of sound measurements to detect density variations, and (4) detection of internal defects by both longitudinal and shear waves. (Author)

AD-288 904 Div. 17, 26
(TISTM/BRW) OTS price $3.60

Brush Beryllium Co., Cleveland, Ohio.
DEVELOPMENT OF FINE DIAMETER HIGH-PURITY WIRE FROM ZONE-REFINED BERYLLIUM.
Progress rept. no. 3, 1 Aug-30 Sep 62,
by A. G. Gross, Jr. and R. G. O'Rourke.
30 Sep 62, 28p. incl. illus. tables, 9 refs.
(Technical rept. no. 285-236)
(Contract NOw 62-0067-c)
Unclassified report

DESCRIPTORS: *Beryllium, *Wire, Drawing (Machine processing), Crystals, Zone melting, Purification, X-ray diffraction analysis, Tensile properties, Heat treatment, Grains (Metallurgy), Metallurgical analysis, Microstructure, Single crystals.

A crystal of zone-refined beryllium (crystal 31, made from cast selected pebble) was converted to 0.00407-in.-diam wire at a very high material yield. Wire made from this crystal did not exhibit any evidence of non-metallic inclusions. It contained no evidence of the non-metallic inclusions which were noted to exist in crystals A and B. Room-temperature tensile strength and yield strength of the as-drawn wire from crystal 31 approached, at high reductions, the strength levels of commercially-pure wire. The room-temperature ductility of the as-drawn wire showed some signs of being greater than that of comparable commercially-pure wire. The wire produced from crystal 31 was heat treated and measurements were made by metallography, X-ray diffraction, and room temperature tensile testing. Metallographic examination revealed that the heat treatment which was used caused appreciable grain growth. This large amount of grain growth confounded interpretation of the results of X-ray diffraction and of tensile testing. However, the tensile properties were at levels which could be structurally useful. (Author)

AD-288 915 Div. 17
(TISTM/BRW) OTS price $4.60

Aeroelastic and Structures Research Lab., Mass. Inst. of Tech., Cambridge.
MECHANICAL BEHAVIOR OF THE TWO-PHASE COMPOSITE,

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by Ric
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TUNGSTEN-NICKEL-IRON,
by Richard H. Krock and Lawrence A. Shepard.
Aug 62, 33p. incl. illus. table, 22 refs. (Rept. no. ASRL TR 94-4)
(Contract AF 49(638)775, Proj. 9782)
Unclassified report

DESCRIPTORS: *Tungsten alloys, Deformation, Nickel alloys, Iron alloys, Composite materials, Sintering, Plasticity, Microstructure, Mechanical properties.

A series of ductile, two phase W-Ni-Fe composites, sintered in the presence of a liquid phase, were tested in tension. Identical room temperature stress-strain curves were obtained for specimens containing from 80 to 92 wt-% W (58 to 75 vol-% W particles). The composites exhibited a maximum elongation of 29% at room temperature, and 10.7% at 77 K. The W particles in the composite elongated by the same amount at these temperatures. Single phase bmmoy specimens matching the composition of the composite matrix showed about one half the flow stress of the composites. The test results demonstrated that the mechanical properties of W-Ni-Fe composites are determined by the W particles alone and are independent of matrix volune fraction or mean free path over the composition range studied. (Author)

AD-288 951 Div. 17
(TISTM/TCG) OTS price $1.10

New York U. Coll. of Engineering, N. Y.
STRUCTURAL SIGNIFICANCE OF DUCTILITY.
Status rept. no. 18, 1 May-30 June 62,
by Ralph Papirno. 30 June 62, 3p.
(Contract NOw 62-0176)
Unclassified report

DESCRIPTORS: *Titanium alloys, *Sheets, *Elasticity, Tests, Stresses, Drilling machines, Vanadium alloys, Chromium alloys, Preparation.

AD-288 954 Div. 17
(TISTM/EJH) OTS price $7.60

Ohio State U., Columbus.
THE CHEMICAL ACTIVITIES OF IRON AND VANADIUM IN BINARY IRON-VANADIUM ALLOYS AND THE VAPOR PRESSURES OF PURE COBALT, IRON, AND VANADIUM.
Doctoral thesis,
by Richard Karl Saxer. 1962, 60p.
Unclassified report

DESCRIPTORS: *Iron alloys, *Vanadium alloys, Phase studies, Thermodynamics, Vapor pressure, Cobalt, Iron, Vanadium, Vacuum apparatus.

AD-288 955 Div. 17
(TISTM/EJH) OTS price $15.00

Ohio State U., Columbus.
THE EFFECT OF STRESS ON STRESS-CORROSION CRACKING OF SOME AUSTENITIC STAINLESS STEEL WIRES IN BOILING 42 WT. PER CENT MAGNESIUM CHLORIDE AQUEOUS SOLUTION.
Doctoral thesis,
by Horace Pearl Hawkes, Jr. 1962, 212p.
Unclassified report

DESCRIPTORS: *Steel wire, *Stainless steel, *Fracture (Mechanics), *Corrosion, Austenite, Stresses, Corrosive liquids, Magnesium compounds, Chlorides, Bibliography.

AD-288 956 Div. 17, 14
(TISTM/TCG) OTS price $3.60

Oklahoma U., Norman.
AN INVESTIGATION OF THE EFFECTS OF CERTAIN LUBRICANTS IN REDUCING FRETTING CORROSION OF CERTAIN STEELS.
Master's thesis,
by Laurence R. Davis. 1962, 29p.
Unclassified report

DESCRIPTORS: *Steel, *Lubricants, *Corrosion inhibition, Effectiveness, Molybdenum compounds, Sulfides, Silicon, Aluminum, Test equipment, Corrosion.

AD-289 325 Div. 17, 25
(TISTM/BRW) OTS price $4.60

Illinois U., Urbana.
THE DIFFUSION OF SINGLE AND DIVACANCIES IN QUENCHED GOLD,
by M. de Jong and J. S. Koehler. July 62, 42p. incl. illus. tables, 26 refs. (Technical rept. no. 3)
(Contract Nonr-183426)
Unclassified report

DESCRIPTORS: *Gold, Lattices, Deformation, Crystal structure, Diffusion, Theory, Cooling, Energy, Heat treatment, Electrical properties, Mathematical analysis.

The best available values are presented for the energies of formation and motion of vacancies and divacancies in gold. In addition, if only single vacancies and divancies are present and if they are in thermal equilibrium, the diffusion of voids can be described using an effective diffusion constant. The effective diffusion constant expresses the fact that each vacancy during its random walk spends part of its lifetime as a single vacancy and part of its lifetime as a divacancy. (Author)

AD-289 446 Div. 17
(TISTP/JW) OTS price $1.60

Metals Research Lab., Carnegie Inst. of Tech., Pittsburgh, Pa.
EXPLICIT EXPRESSIONS FOR THE ENERGY OF DISLOCATION CONFIGURATIONS MADE UP PIECEWISE OF STRAIGHT SEGMENTS,
by Jens Lothe. 1962, 19p.
(Contract Nonr-76008)
Unclassified report

DESCRIPTORS: *Energy, *Dissociation, Tensile properties, Elasticity.

AD-289 526 Div. 17
(TISTM/AJM) OTS price $5.60

Aluminum Co. of America, Pittsburgh, Pa.
DEVELOPMENT OF ALUMINUM-BASE ALLOYS.
Annual progress rept., 29 Sep 61-30 Sep 62,
by R. J. Towner. 16 Oct 62, 56p. incl. illus. tables, 4 refs. (Rept. no. 7-62-AP-59-S)
(Contract DA 36-034-ORD-3559, Proj. 593-32-004)
Unclassified report

DESCRIPTORS: *Aluminum alloys, *Powder metallurgy, Powder alloys, Powder metals, Zinc alloys, Magnesium alloys, Copper alloys, Aging, Hardening, Dispersion hardening, Heat treatment, Mechanical properties, Microstructure, X-ray diffraction analysis, Additives, Manganese, Iron, Nickel, Chromium, Titanium, Vanadium, Zirconium, Cobalt, Molybdenum, Tungsten, Extrusion.

An investigation of the feasibility of producing Al alloy extrusions with a yield strength at room temperature of 125,000 psi or higher was begun. The powder metallurgy approach was used in an attempt to obtain a combination of age

hardening and dispersion hardening in Al-Zn-Mg-Cu alloys to which insoluble alloying elements were added. A method of fabricating atomized alloy powders, which contained the fine dispersion of alloying elements, into relatively large (2 in. diam) extrusions of high quality was developed. After heat treatment, the highest longitudinal yield strength developed to date was 118,700 psi and the highest tensile strength was 122,400 psi. Three alloys had ratios of yield strength to density of 1.12 million in. (Author)

18. MILITARY SCIENCES AND OPERATIONS

AD-287 997 Div. 18, 26
(TISTW/PCR) OTS price $1.60

RAND Corp., Santa Monica, Calif.
COSTING TOMORROW'S WEAPON SYSTEMS,
by David Novick. June 62, 12p. incl. illus.
(Research memo. no. RM-3170-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Costs, *Weapons, Analysis.

Costing tomorrow's weapon systems is a difficult and uncertain but essential process: essential for budget preparation and essential for major program decisions. As far as the first application is concerned it is difficult to conceive of budgeting for a weapon system project without cost estimates, regardless of their validity. The decision-making application is more controversial. As a result of some very low estimates in the past, some analysts have taken the position that the use of cost estimates in systems analysis should be minimized or even eliminated. The basic flaw in this argument is that poor cost estimates are merely a reflection of the inadequacies of weapon system designers and planners. Cost analysts work from a program description provided by the other members of the team, and by far the most significant variance between initial estimates and final costs are due to changes in the original requirements rather than to an inappropriate price tag hung on an unchanging configuration. (Author)

AD-288 709 Div. 18
(TISTW/RD) OTS price $4.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INTRODUCTION AND CHAPTER I, ENTITLED 'FROM THE HISTORY OF ANTI-AIRCRAFT DEFENSE,'
by V. P. Ashkerov, B. G. Zabelok and others.
28 May 62, 43p. (Trans. no. FTD-TT-61-300 from Voyska Protivovozdushnoy Oborony Strany, Moscow, pp. 3-34, 1960)
Unclassified report

DESCRIPTORS: *Antiaircraft defense systems, History, Weapons, USSR.

AD-288 826 Div. 18
(TISTB/MS) OTS price $4.60

Stanford Research Inst., Menlo Park, Calif.
THE PRESERVATION AND EMPLOYMENT OF A CRITICAL MILITARY FORCE: A CASE HISTORY OF THE BRITISH GRAND FLEET FROM 1900 TO 1916,
by Leonard Wainstein. July 62, 40p. 25 refs.
(Contract Nonr-379400)
Unclassified report

DESCRIPTORS: *Fleets, *Naval operations, *Naval research, Naval mobilization, Naval vessels, Warfare, Great Britain, History.

This is a report of research conducted as part of the project, "Operations Analysis for Seaborne Deterrence Systems." It represents one of a series of related studies concerned with systems research on advanced sea-based deterrence concepts, and is intended to provide an understanding of the constraints and limitations on the design and configuration of possible future sea-based strategic systems. The report is interpretive in nature. The technique of analysis employed has been that of intuitive judgment applied to observable factors in history, based upon experience and related research studies. Documentation is not made, therefore, for each assertion or assessment. (Author)

AD-288 957 Div. 18, 23
(TISTW/RD) OTS price $5.60

Operational Applications Lab., Air Force Cambridge Research Center, Washington, D. C.
A FIELD TRYOUT OF A TEACHING MACHINE FOR TRAINING IN SAGE OPERATIONS,
by Sylvia R. Mayer and Robert L. Westfield.
Oct 58, 49p. (OAL TM 58-16)
(Proj. 1975)
Unclassified report

DESCRIPTORS: *Antiaircraft defense systems, *Teaching machines, Training devices, Training.

AD-289 093 Div. 18
(TISTB/MS) OTS price $1.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
MATHEMATICAL MODEL SIMULATION OF THE LOGISTICAL SUPPORT FOR AMPHIBIOUS OPERATIONS,
by R. C. Towne and B. H. Bryner. 5 Nov 62, 19p. incl. illus. tables (Technical note no. TN-470)
(Proj. Y-F015-03-001)
Unclassified report

DESCRIPTORS: *Cargo, *Amphibious operations, *Logisitcs, *Conveyors, *Computers, Handling, Mathematical analysis, Simulation.

The purpose of this task is to develop improved transfer systems capable of handling all materials utilized in amphibious operations and initial advanced base supply. This report describes the initial development of a computer simulation of the logistic support of amphibious operations. The results of this work indicate that the mathematical simulation in its present form will not provide reliable answers, but with proposed improvements a computer program can be developed to compare and evaluate logistic systems and components. Development work is continuing. (Author)

19. NAVIGATION

AD-288 527 Div. 19
(TISTW/RD) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CONTRIBUTION TO THE PROBLEM OF THE GYROSCOPE-STABILIZED PLATFORM WITH THE PERIOD OF NATURAL

OSCILLATIONS T = 84.4 MIN.,
by V. A. Karakashev. 15 Oct 62, 15p. incl. illus. tables, 12 refs. (Trans. no. FTD-TT-62-1157 from Izvestiya Vysshykh Uchebnykh Zavedeniy. Priborostroyeniye, No. 2, pp. 67-75, 1959)
Unclassified report

DESCRIPTORS: *Gyro stabilizers, *Gyroscopes, *Inertial navigation, USSR, Navigation.

AD-288 998 Div. 19
(TISTW/RD) OTS price $2.60

ACF Electronics Div., ACF Industries, Inc., Paramus, N. J.
ULTRASONIC SHIPS LOG.
Final rept.,
by D. E. Willig. 15 Aug 61, 20p. (Rept. no. AR 1412)
(Contract NObs-78682, Proj. 26004)
Unclassified report

DESCRIPTORS: *Navigation, *Doppler navigation, Nonlinear systems, Ultrasonic radiation, Ultrasonics, Sound, Scattering, Transducers, Distortion, Ships.

AD-289 322 Div. 19, 1
(TISTA/GEC) OTS price $11.50

General Dynamics/Pomona, Calif.
INVESTIGATION OF FINAL APPROACH AND LANDING CONTROL SYSTEMS FOR FUTURE EMERGENCY MISSION SUPPORT,
by M. E. Buehler, L. Kashdan, and J. S. Stanton. July 62, 154p. incl. illus. tables, 127 refs. (Rept. no. TM 339-132)
(Contract AF 19(604)8855)
Unclassified report

DESCRIPTORS: *Airplane landings, *Ground controlled approach radar, Glide path systems, Communication systems, Air force operations, Military requirements, Operations research, Research program administration, Air traffic control systems, All-weather aviation.

The geometrical, communication coding and sensing aspects of manual aircraft control during blind approach and landing are analyzed with respect to operational objectives for emergency mission support systems. The capability of alternate radar tracking approaches to provide the required vertical and lateral velocity discrimination are analyzed in detail. A hypothetical model for message spaces employed by pilots in coding the visual field is postulated, and a bi-dimensional auditory coding scheme is proposed for the same messages. A preliminary system design is outlined and an applied research program is recommended to satisfy operational requirements. (Author)

AD-289 496 Div. 19
(TISTP/JW) OTS price $1.10

Dunlap and Associates, Inc., Stamford, Conn.
AUTOMANUAL CONTROL,
by Charles R. Kelley and G. Victor Guinness, Jr. 1961, 8p.
Unclassified report

Presented at the Annual Convention of the American Psychological Association, 5 Sep 61, New York City.

DESCRIPTORS: *Control systems, *Instrumentation, Analog computer.

AD-289 536 Div. 19
(TISTW/ RD) OTS price $2.50

Wilcox Electric Co., Inc., Kansas City, Mo.
DESIGN AND DEVELOPMENT OF THE GENERAL AVIATION TRANSPONDER.
Final engineering rept.,
by Richard W. Donovan. 18 July 62, 53p. incl. illus.
(Contract FAA/BRD-234)
Unclassified report

DESCRIPTORS: *Radar beacons, Coding, Identification systems, Design, Electronic circuits, Air traffic control systems, L band, Airborne.

The final effort on the design and development of an Air Traffic Control Transponder for general aviation use is reported. The transponder operates in the L Band, incorporating a superheterodyne receiver and a grid-pulsed triode cavity transmitter. The unit decodes proper Mode A (8.0 usec) interrogations, and replies with a maximum of nine pulses (two framing pulses, six information pulses, and an identification (I/P) pulse). The receiver sensitivity is -74 dbm and the peak power output is 27 ± 3 db. The unit is contained in a short 3/8 ATR full height case, and weighs 10.5 lbs. The transponder is powered from either a 13.75 vdc or a 27.5 vdc source, and requires 32 watts at normal reply rates. (Author)

20. NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-287 963 Div. 20, 4
(TISTM/TCG) OTS price $1.60

Queen's U., Belfast (Gt. Brit.).
ISOTOPE SHIFT IN Li AND B2t,
by M. R. Flannery and A. L. Stewart. 1962, 9p. tables, 8 refs.
(Grant no. AF-EOARDC 61-16)
(AFCRL 62-1065) Unclassified report

DESCRIPTORS: *Mass number, *Polarization, *Isotopes, *Lithium, *Boron, Ions, Energy, Atomic mass unit, Atomic energy levels, Electron mass, Theory, Mathematical analysis.

The mass polarization or specific isotope shift of the resonance lines of Li and B(2t) is calculated using open-shell type wave functions and the shifts of the resonance lines. The results are also compared with the values obtained using an alternative form of the mass polarization operator. (Author)

AD-288 017 Div. 20
(TISTB/SAT) OTS price $3.60

Uppsala U. (Sweden).
COSMIC RAY INTENSITY VARIATIONS DURING 1961,
by A. E. Sandstrom, E. Dyring and others. 31 Mar 62, 21p. illus. tables (Technical scientific note no. 12)
(Contract AF 61(514)1312)
(AFCRL 62-675) Unclassified report

DESCRIPTORS: *Cosmic rays, *Mesons, *Nucleons, Particles, Pions, Errors, Solar flares, Diurnal variations.

The note consists mainly of tables of the first and second harmonics of the daily variation recorded during 1961 in Uppsala and Kiruna. The

yearly mean daily variations are illustrated by clock diagrams. Only a few prominent Forbush decreases followed by cosmic ray storms were recorded during 1961. Diagrams illustrate the intensity variations in per cent of a normal counting rate. One section and a couple of diagrams are devoted to the solar flare effects during July 1960. (Author)

AD-288 022 Div. 20
(TISTP/WH) OTS price $1.10

California U., Berkeley.
SIZEABLE DYNAMIC PROTON POLARIZATIONS,
by T. J. Schmugge and C. D. Jeffries. 15 Aug 62, 9p. incl. illus. table, 4 refs. (Technical rept. no. 11)
(Contract Nonr-22261)
Unclassified report

DESCRIPTORS: *Protons, *Polarization, *Nuclear magnetic resonance, *Forbidden transitions, Single crystals, Nitrates, Magnesium compounds, Lanthanum compounds.

By extending previous work (Phys. Rev. 122:1781 (1961)) to higher fields and frequencies we produced nuclear polarizations as large as 51% for the protons in the waters of hydration in single crystals of lanthanum magnesium nitrate, La2Mg3(NO3)12.24 H2O, in which 1% of La(3+) is replaced by paramagnetic Nd(3+). The energy levels of a Nd(3+) ion of effective spin S = 1/2 and a proton of spin I = 1/2 in a magnetic field H are shown. (Author)

AD-288 036 Div. 20,
(TISTP/GRW) OTS price $1.60

Aerospace Information Div., Washington, D. C.
SOVIET EXPERIMENTAL UF6 REACTOR, A REVIEW OF SOVIET LITERATURE,
18 Oct 62, 10p. incl. illus. 4 refs. (AID rept. no. 62-172)
Unclassified report

DESCRIPTORS: *Homogeneous reactors, USSR, Fluorides, Uranium compounds, Feasibility studies.

The reactor is a homogeneous-type with metallic beryllium moderator and graphite reflector. General views and construction details are shown. (Author)

AD-288 068 Div. 20, 25
(TISTP/JW) OTS price $1.60

Basle U. (Switzerland).
NEW ENERGY LEVELS OF THE NO - MOLECULE.
Technical rept.,
by E. Miescher. May 62, 9p. incl. illus. tables, 4 refs.
(Grant no. AF-EOARDC 61-19)
(AFCRL 62-1016)
Unclassified report

DESCRIPTORS: *Absorption, *Spectrographic analysis, Nitrogen compounds, Oxides, Energy, Molecules, Distribution, Measurement.

The study of the absorption spectrum of nitric oxide is continued on high dispersion plates. From rotational analyses of bands in the very complex region below 1500 degrees additional information is obtained for many new recently identified states of the nitric oxide molecule. A consistent interpretation of the observed Rydberg-states is given. Nitric oxide emission bands in the visible and infrared are photographed in high dispersion. Preliminary results from the measurements confirm the interpretation of some of the bands. (Author)

AD-288 094 Div. 20
(TISTP/FR) OTS price $1.60

Aerospace Corp., El Segundo, Calif.
MODIFICATION OF THE HIGH ENERGY PROTON SPECTROMETER TO MEASURE ELECTRONS AND LOW ENERGY PROTONS,
by F. S. Mozer, J. D. Mihalov, and D. D. Elliott. 25 Aug 62, 14p. incl. illus. (Rept. no. TDR-69(2260-21)TN-2)
(Contract AF 04(695)69)
(DCAS TDR 62-172) Unclassified report

DESCRIPTORS: *Scintillation counters, *Pulse height analyzers, Protons, Electrons, Pulse amplifiers, Power supplies, Photomultipliers, Cesium compounds, Iodides, Crystals.

The capability of the high energy proton spectrometer system developed to measure the flux and energy spectrum of protons above 1 mev in the Van Allen radiation belts and interplanetary space has been expanded to enable measurements of protons and electrons between about 40 kev and 4 mev. Modifications to the system include the addition of two detectors (one for low energy proton detection and one for electron detection), and the addition of a programmer circuit and 7 channels to the 5 channel electronic analyzer package. (Author)

AD-288 096 Div. 20, 25
(TISTP/WH) OTS price $1.60

Aerospace Corp., El Segundo, Calif.
CALIBRATION OF THE OMNIDIRECTIONAL PROTON SPECTROMETER,
by Stanley C. Freden and George A. Paulikas.
25 Aug 62, 7p. incl. illus. (Rept. no. TDR-69(2260-22)TN-1)
(Contract AF 04(695)69)
(DCAS TDR 62-170) Unclassified report

DESCRIPTORS: *Spectrographic analysis, *Protons, *Proton scattering, *Calibration.

Calibration and adjustment procedures for the subunits of the omnidirectional proton spectrometer are provided. (Author)

AD-288 113 Div. 20, 8
(TISTW/RD) OTS price $8.60

General Electric Co., Santa Barbara, Calif.
A FORTRAN II CODE FOR THE CALCULATION OF ELECTROMAGNETIC BLACKOUT FOLLOWING A HIGH-ALTITUDE NUCLEAR DETONATION,
by P. G. Fischer, R. H. Christian and R. W. Hendrick. 29 Dec 61, 87p. incl. illus. tables, 3 refs. (Rept. no. RM 61TMP-96)
(Contract DA 49-146-XZ-038)
(DASA-1292) Unclassified report

DESCRIPTORS: *Nuclear explosions, *Electromagnetic fields, *Electromagnetic waves, Digital computers, Coding, Ionization, X rays, Gamma rays, Neutrons, Programming, High altitude, Attenuation, Absorption.

A program is considered which computes, as functions of time, altitude, and range, the electron concentration and resulting electromagnetic absorption for specified detonation and debris histories. The computation includes initial ionization due to x rays, gamma rays, neutrons, and debris, as well as delayed ioniza-

tion due to the continuing beta and gamma radiation from the debris. It computes the transient recombination and quasi-equilibrium solutions for electron concentrations and the incremental electromagnetic wave absorption (decibels/kilometer) at the required altitudes for up to three specified frequencies. From these, the altitudes of specific electron concentration contours are interpolated and the one-way vertical absorption is obtained by trapezoidal integration. The computation is carried out for an atmosphere which approximates the 1959 ARDC atmosphere and includes the curvature of the earth. Atmospheric reaction rates are assumed to be those of the ambient air, except in the close-in, very disturbed regions, where approximate corrections appropriate to early times have been included. (Author)

AD-288 265 Div. 20
(TISTB/SAT) OTS price $1.60

International Astronautical Congress, Berne (Switzerland).
THE INTENSITY OF THE X-RAY RADIATION OF THE SUN NEAR THE SHORT-WAVE EDGE OF THE SPECTRUM,
by S. Mandelstam, I. Tindo and others. 1962, 4p. illus. tables.
Unclassified report

Paper presented at XIII International Astronautical Congress, 23-29 September 1962, Varna, Bulgaria.

DESCRIPTORS: *X rays, *Spaceships, *Solar energy, Rockets, USSR, Halogens, Digital computers, Intensity.

The results of the rocket- and sputnikburn measurements of the intensity of the X-ray radiation of the quiet sun below 10 angstroms are given and a comparison is done between experimentally obtained fluxes and these of theoretical calculations, including such radiative processes, as emission of spectral lines and continuous radiation by free-free and by free-bound transitions. (Author)

AD-288 441 Div. 20
(TISTB/CCH) OTS price $1.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
PROTECTION AGAINST INTENSE THERMAL RADIATION (A DEVICE FOR AUTOMATICALLY CLOSING VENETIAN BLINDS).
Final rept.,
by J. C. King. 27 July 62, 18p. (Technical rept. no. R-211)
(Proj. no. Y-R011-01-043)
Unclassified report

DESCRIPTORS: *Thermal radiation, Countermeasures, Automatic, Safety devices, Detectors.

AD-288 639 Div. 20, 15
(TISTM/ODN) OTS price $1.60

Theoretical Chemistry Inst., U. of Wisconsin, Madison.
NON-UNIFORM SCALING OF AN APPROXIMATE H2(+) WAVE FUNCTION,
by William J. Meath and Joseph O. Hirschfelder. 29 Oct 62, 11p. (Rept. no. WIS-TCI-4, Series 3)
(Contract AF 33(657)7311, Proj. 7013)
Unclassified report

DESCRIPTORS: *Hydrogen, *Ions, Statistical analysis, Nuclear physics, Quantum mechanics, Functions, Wave analysis, Theory.

The approximate wave function for the H2(+) molecule is presented. Energy optimization of the non-uniform scaling parameter results in the satisfaction of the one-coordinate virial theorem, and energy optimization of the uniform scaling parameter results in the satisfaction of the usual virial theorem. The simultaneous application of these two types of scaling is discussed. (Author)

AD-288 651 Div. 20
(TISTP/WH) OTS price $3.60

Naval Academy, Annapolis, Md.
THA ANGULAR DISTRIBUTION OF NEUTRONS FROM THE C12(t, n)N14 REACTION AT 1.75 MEV,
by Gaylord T. Hageseth. Sep 62, 27p. incl. illus. tables, 18 refs. (Research rept. no. S-3)
(Contract Nonr-224904, Proj. NR 015-909)
Unclassified report

DESCRIPTORS: *Differential cross sections, *Tritium, *Targets, *Carbon, *Nitrogen, *Elastic scattering, *Neutrons, *Nuclear models, Photographic emulsions.

A C-12 target was bombarded with tritium at 1.75 mev using the 2.00 mev Van de Graaff accelerator at the Naval Research Laboratory. The angular distribution of neutrons leaving N-14 in the ground state, first excited state, and second excited state were measured. The angular distribution indicated that a direct interaction model is more applicable than a compound nucleus model. (Author)

AD-288 934 Div. 20, 8
(TISTP/JW) OTS price $8.60

Edgerton, Germeshausen and Grier, Inc., Boston, Mass.
ANALYSIS OF EXPERIMENTAL RADIATION EFFECTS DATA.
Rept. no. 4 (Final) 1 June 61-31 May 62,
by John L. Vidrine. 31 July 62, 91p. incl. illus. tables (Rept. no. B-2462)
(Contract DA-36-039-sc-87306, Proj. 3A99-21-001)
Unclassified report

DESCRIPTORS: *Radioactivity, *Radiation hazards, *Radiation effects, Gamma rays, Neutrons, Transistors, Semiconductors.

The data obtained from the radiation effects monitoring system employed at Godiva II, Triga, and KEWB on a previous contract were reduced and analyzed. On the basis of plots of the experimental data obtained from the original magnetic tape records, an attempt was made to develop a suitable phenomenological expression for the effects of a pulsed nuclear environment on the characteristics of the selected semi-conductor devices tested. Expressions were derived that appeared to satisfy the conditions upon the analysis of the experimental data. When subjected to mathematical reduction the expressions proved to be plausible from the standpoint of the physics involved. The results were entirely satisfactory on the basis of a phenomenological model. (Author)

AD-289 059 Div. 20
(TISTP/JW) OTS price $2.60

Naval Radiological Defense Lab., San Francisco, Calif.
NEUTRON AND GAMMA-RAY DOSIMETRY IN AN ANIMAL

EXPOSURE VOLUME AT A PULSED TRIGA REACTOR,
by R. E. Simpson, E. Tochilin and N. Goldstein.
17 Sep 62, 27p. incl. illus. tables, 17 refs.
(Rept. no. NRDL-TR-583)
Unclassified report

DESCRIPTORS: *Gamma rays, *Neutrons, Measurement, Neutron flux density, Radiation effects, Laboratory equipment, Laboratory animals, Dosimeters.

The distribution of steady-state and pulsed, neutron and gamma-ray dose was measured in an animal exposure volume at the TRIGA reactor. The usable volume was restricted to the lower 20 in. of an aluminum irradiation tube having an ID of 9-1/2 in. The tube was inserted into the pool adjacent to the reactor void tank, 134 cm from the core. Dosimetry films were used to determine gamma-ray dose while Sievert ionization chambers were used to determine neutron dose. Gold foils were used to measure the thermal neutron flux. Neutron doses were referenced to sulphur foil monitors. The neutron spectrum was examined with a system of threshold detectors and compared with spectra from Godiva II and the biological port of the Argonne CP-5 reactor. The vertical variation of dose along a lucite board was measured at the midplane of a lucite canister lowered into the tube. The dose in the lower 16 in. varied less than 5%. The ratio of neutron to gamma dose was approximately 6 to 1. A tissue equivalent dog phantom, 20 in. long and 7-1/2 in. in diameter, was designed to determine the absorbed dose in depth. The fast neutron dose was about equal to the gamma-ray dose at the midline of the phantom. The neutron plus gamma-ray dose at the midline was 44% of the dose at the front surface of the phantom. (Author)

AD-289 094 Div. 20
(TISTP/JW) OTS price $1.10

Naval Research Lab., Washington, D. C.
DETERMINATION OF THE J-VALUES OF S-TYPE NEUTRON RESONANCES BY MULTIPLE SCATTERING, PART 2.
Final rept.,
by S. Podgor and A. W. Saenz. 29 Oct 62, 5p.
incl. illus. tables (NRL rept. no. 5851)
Unclassified report

DESCRIPTORS: *Neutrons, *Neutron cross sections, Scattering, Polarization, Resonance, Numerical methods and procedures.

The relevance of multiple scattering measurements is applied to the J-values of s-type neutron resonances of a predominantly scattering variety. Monte Carlo calculations were carried out for unpolarized neutrons incident on unpolarized targets with plane-parallel slab geometry. The major part of these computations deal with ''general'' values of the pertinent nuclear parameters, rather than with values corresponding to specific nuclei. (Author)

AD-289 328 Div. 20, 25, 4
(TISTM/ODN) OTS price $1.60

Noyes Chemical Lab., U. of Illinois, Urbana.
NMR STUDIES OF CONFORMATIONAL EQUILIBRIA IN SUBSTITUTED ETHANES,
by H. S. Gutowsky. Aug 62, 11p. incl. illus. table, 11 refs. (Technical rept. no. 56)
(Contract Nonr-183413, Proj. NR 051-215)
Unclassified report

DESCRIPTORS: *Ethanes, *Halocarbons, *Nuclear magnetic resonance, Isomer, Molecular isomerism, Protons, Temperature, Theory, Atoms, Fluorine, Molecular spectroscopy, Energy, Chlorides, Fluorides, Bromides, Liquids, Molecular rotation, Chemical bonds.

This report deals with the application of nmr techniques to the rotational isomerism of substituted, liquid ethanes. Factors governing the appearance of the nmr spectra of these compounds include the relative energies of the three rotational isomers, the potential barriers to internal rotation about the C-C bond, and the chemical shifts and coupling constants characteristic of the magnetic nuclei in each rotamer. Rotamers of the compound CHX2CFX2 are the meso form, with the H and F atoms trans, and the dl pair, with the H and F atoms gauche. At temperatures low enough to freeze out averaging by internal rotation the proton, and also the fluorine, spectrum consists of a doublet for each rotamer. The nmr transition probabilities depend on nuclear properties so that to a very good approximation the relative intensities of the doublets are directly proportional to the relative populations of trans and gauche rotamers. Their energy difference can be obtained directly from the intensities, without the corrections and uncertainties common in studies of vibrational spectra. (Author)

AD-289 349 Div. 20
(TISTP/FR) OTS price $3.60

Naval Civil Engineering Lab., Fort Hueneme, Calif.
GAMMA RAY ATTENUATION IN A 12-INCH DIAMETR ROUND CONCRETE DUCT,
by T. R. Fowler and C. H. Dorn. 5 Nov 62, 30p.
incl. illus. tables, 4 refs. (Rept. no. TN-465)
Unclassified report

DESCRIPTORS: *Gamma rays, *Ducts, Concrete, Attenuation, Scattering, Measurement.

Dosimeter and Geiger tube measurements were made along the centerline of a 12-inch diameter circular concrete duct with two right-angle bends. Measurements showed that the build-up factor in the first leg was the same as that found in earlier work for the square duct. As with the square duct, the dosage received down one leg of the duct follows closely the functional form K/x to the m, where x is the distance along the axis of the duct, and K and m are empirical constants. The value of m for a round duct has been found to be about 10% smaller than that found for square ducts of similar size. The attenuation of the corner, however, is greater for a round duct than for a square one. A theoretical treatment of the first leg using single-scattering theory is included. (Author)

AD-289 408 Div. 20
(TISTP/JW) OTS price $1.60

Sloane Physics Lab., Yale U., New Haven, Conn.
(No title).
Final rept., 1 Feb 55-31 Dec 60,
by Frederick E. Steigert. 31 Dec 60, 10p.
(Contract Nonr-60914)
Unclassified report

DESCRIPTORS: *Energy, *Nuclear physics, Scattering.

AD-289 413 Div. 20
(TISTP/JW) OTS price $1.10

Nobel Inst. for Physics (Sweden).
INVESTIGATIONS OF GAMMA RADIATION FROM NUCLEAR

REACTIONS.
Technical rept. for 1 Feb 61-31 Jan 62,
by K. G. Malmfors. 3 July 62, 3p.
(Grant EOARDC 61-8)
Unclassified report

DESCRIPTORS: *Radiation effects, *Nuclear reactions, Gamma ray spectra, Cyclotrons.

AD-289 433 Div. 20
(TISTP/JW) OTS price $1.60

Sydney U. (Australia).
(No title).
Technical final rept., 1 July 61-30 June 62.
30 June 62, 6p.
(Grant AF-AFOSR-61-92)
Unclassified report

DESCRIPTORS: *Cosmic rays, *Energy, *Nuclear energy levels, Particles, Atmosphere.

AD-289 439 Div. 20
(TISTP/JW) OTS price $1.10

Illinois U., Urbana.
TRANSVERSE POLARIZATION OF CONVERSION ELECTRONS FOLLOWING BETA DECAY,
by B. Blake, R. Bobone and others. 1960, 6p.
(Contract Nonr-183405)
Unclassified report

DESCRIPTORS: *Polarization, *Beta decay, Electrons, Energy, Conversion ratio.

AD-289 528 Div. 20
(TISTP/WH) OTS price $3.60

Air Force Cambridge Research Labs., Bedford, Mass.
A SHORT SURVEY OF RECENT NUCLEAR REACTION EXPERIMENTS EMPLOYING 1-3 MEV PARTICLE ACCELERATORS,
by E. F. Kennedy. June 62, 35p. refs. (Rept. no. AFCRL 62-162)
(Proj. 5620)
Unclassified report

DESCRIPTORS: *Radiochemistry, *Nuclear reactions, *Van de Graaff generators, *Scattering, Elastic scattering, Inelastic scattering, Neutron capture, Nuclei.

A short survey is presented of the nuclear physics experiments which were performed recently, using particle accelerators similar to the 3-Mev positive or negative polarity Van de Graaff accelerator possessed by the Air Force Cambridge Research Laboratories. (The publications covered in the survey are those in the Physical Review and Nuclear Physics from January to September 1960, and those whose abstracts appeared in the Nuclear Physics Abstracts from January to September 1960. Abstracts in the Bulletin of the American Physical Society from January to September are also included.) (Author)

AD-289 566 Div. 20, 25
(TISTP/JW) OTS price $9.60

Solid State Radiations, Inc., Los Angeles, Calif.
SOLID STATE IONIZATION CHAMBER NEUTRON DETECTORS.
Final rept.
Nov 62, 113p. incl. illus. table.
(Contract DA 18-108-405-cml-1012)
Unclassified report

DESCRIPTORS: *Radiation effects, *Neutron spectroscopy, Semiconductors, Sensitivity, Ionization chambers, Solid state physics, Electronic systems, Detection.

Results of a study of methods of utilizing the semiconductor radiation detector for neutron detection and spectroscopy are presented. The study has resulted in the development of various neutron sensitive coated detectors and the Li6 epithermal neutron spectrometer system, including the Li6 sandwich detector and a complete integrated electronic system. Techniques for applying various neutron sensitive materials to detector surfaces have been developed and resulting units have been produced which are useful for thermal or threshold neutron detection. An analytical method is presented which adequately predicts the response of coated detectors as a function of converter material thickness, detector dead layer, and discriminator settings. The epithermal spectrometer detector developed under this program consists of a layer of Li6 sandwiched between two detectors in an hermetically sealed package. The system is basically satisfactory, but a number of improvements should be incorporated including the selection of very thin window detectors, using lithium metal for a coating material instead of a fluoride, and determination of an optimum combination of discriminator and coincidence time settings. Operation at higher neutron energies indicated a serious interference due to neutron reactions in the silicon itself which may impose an upper energy limit for practical use of the device. (Author)

21. NUCLEAR PROPULSION

No Entries

22. ORDNANCE

AD-287 905 Div. 22, 1
(TISTA/GEC) OTS price $5.60

Courtney and Co., Philadelphia, Pa.
THE OPERATIONAL FLIGHT TRAINER IN AVIATION SAFETY,
by Kenneth W. Colman, C. Glenn Davis, and Douglas Courtney. July 62, 58p. incl. tables, 62 refs.
(Contract N61339-520)
(NAVTRADEVCEN TR 520-1)
Unclassified report

DESCRIPTORS: *Flight simulators, *Aviation safety, Pilots, Errors, Jet fighters, Aviation accidents, Statistical analysis, Design, Detection, Decision making, Feedback, Failure (Mechanics), Effectiveness, Naval aircraft, Training devices.

A study was made of the utilization potential of operational flight trainers (OFT) toward the reduction of aircraft accidents based on the concept of an aircraft as a man-machine system. Both ''materiel errors'' and ''pilot errors'' are perceived as the result of inadequate interaction between the pilot and his aircraft in all modes of flight. Beginning with an analysis of jet aircraft accidents, this study also includes

intensive interviews with experienced pilots as well as personal observations of current simulator utilization. This study recommends certain specific action in the areas of: instructional techniques, syllabus construction, instructor selection, utilization of OFT equipment, and design of OFT. (Author)

AD-287 915 Div. 22
(TISTM/BRW) OTS price $2.60

Institute of Metals and Explosives Research, U. of Utah, Salt Lake City.
CHEMICAL REACTION RATES AND THE SHOCK INITIATION OF DETONATION IN LIQUID EXPLOSIVES,
by Alan Bauer, Melvin A. Cook and Robert T. Keyes. 3 Sep 62, 20p. incl. illus. tables, 14 refs.
(Contract AF 18(603)100)
Unclassified report

DESCRIPTORS: *Explosives, Detonation, Chemical reactions, Methane, Nitro radicals, Amines, Ethyl radicals, Tetryl, TNT, Detonation waves, Shock waves, Reaction kinetics, Liquids.

Detonation velocity-charge diameter curves were obtained for the liquid explosives, nitromethane (NM), dithekite-13 (D-13), D-8, 97.2/2.8 NM-ethylene diamine, 80/20 NM-tetryl, and 80/20 NM-TNT. A point initiation model for liquid explosives, according to which the chemical reaction was assumed to start at small centers and proceed at radically outward, was developed and applied with the detonation head model to determine chemical reaction times for NM and D-13. The shape of the velocity-diameter curves and the manner in which they were fit by the calculations indicated that indeed detonation reactions in liquid explosives expand outward from small centers of initiation. Preliminary measurements of the pressure associated with the super velocity or flash-across phenomenon observed in the shock initiation of liquid explosives are also presented. The measurements were made to determine if this phenomenon, which propagates from the barrier-receptor interface to the initial shock front during the card gap tests at velocities that exceed the normal detonation velocity, is governed by hydrodynamic laws of wave propagation. (Author)

AD-288 016 Div. 22, 2
(TISTP/FR) OTS price $7.60

High Velocity Lab., U. of Utah, Salt Lake City.
ABSOLUTE LUMINOSITY, SIZE, AND VELOCITY OF INDIVIDUAL LABORATORY MICROMETEORS,
by J. C. Bryner, E. P. Palmer and R. R. Kadesch. July 62, 73p. incl. illus. tables, 28 refs.
(Technical rept. no. UU-10)
(Contract AF 04(647)942)
(BSD TDR 62-270) Unclassified report

DESCRIPTORS: *Hypervelocity projectiles, *Meteors, Ablation, Velocity, Luminescence, Spheres, Iron, Detectors, Photomultipliers, Vacuum systems.

Single, submicron-sized artificial meteors with velocities as high as 10.2 km/sec were observed for the first time. These particles are found in the spray resulting from the impact of 7/32 inch steel balls upon massive iron targets in a vacuum detection chamber with the pressures ranging between 0.1 and 1.0 mm of mercury. Spray particle velocities are measured by a time-of-flight technique using four photomultiplier detectors whose outputs are displayed on two Tetronix type 551 oscilloscopes. Absolute luminosity measurements of the individual spray particles are made representing the first such data obtained under controlled laboratory conditions and for particles of known size and mass. (Author)

AD-288 032 Div. 22
(TISTW/RD) OTS price $1.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
DESIGN AND DEVELOPMENT OF A RAMMER-LOADER FOR THE NEW 105MM LIGHT-WEIGHT HOWITZER.
Final rept., 14 Oct 60-15 Aug 62, by Howard R. Breuer. 15 Aug 62, 11p. incl. illus. (Rept. no. F-A2468)
(Contract DA 36-034-503-ORD-3346, Proj. 545-03-030-03)
Unclassified report

DESCRIPTORS: *Loaders, *Howitzers, *Rammers, Ammunition, Human engineering.

A loader-rammer for the improved 105mm Howitzer is described. The foot operated chain type rammer provides positive ramming at all angles of elevation for inter-mixed rounds of various lengths. The foot motion to actuate the device is the same regardless of elevation and type of round. Sequence of operation is described. Human engineering studies are recommended for final evaluation and design. (Author)

AD-288 114 Div. 22, 30
(TISTW/RD) OTS price $2.60

General Electric Co., Burlington, Vt.
PRODUCIBILITY STUDY OF ADAPTION KIT ATOMIC WARHEAD TO ROCKET, XM77 PHASE II ASSOCIATED INSPECTION AND TEST EQUIPMENT.
Final summary rept., 31 Dec 61, 17p. incl. tables.
(Contract DA 28-017-501-ORD-3617)
Unclassified report

DESCRIPTORS: *Nuclear warheads, *Rocket heads, Test equipment, Quality control, Gages.

Charts are presented which list all the gages, fixtures, test panels, and other inspection and test equipment designed and procured for use with the XM77 Adaption Kit and its components. (Author)

AD-288 130 Div. 22, 4
(TISTM/ODN) OTS price $1.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
THE SURFACE CHEMISTRY OF EXPLOSIVES,
by Cecil G. White, Thomas C. Castorina and others. Nov 62, 20p. incl. illus. 6 refs.
(Picatinny Arsenal technical rept. no. 3008)
(DA proj. 503-05-021)
Unclassified report

DESCRIPTORS: *Explosives, *RDX, *HMX, Surfaces, Adsorption, Polymers, Ammonium radicals, Salts, Toluenes, Methyl radicals, Bromides, Stearic acids, Benzenes, Acrylic resins, Labeled substances, Carbon, Scintillation counters, Lead compounds, Nitrides, Surface properties.

A preliminary experiment using C-14 labeled polymethyl methacrylate of undetermined high molecular weight in toluene yielded isotherms using HMX and RDX surfaces. An interpretation of these results as a function of molecular weight

led to the selection of various long chain compounds, of varying complexity, as agents to be studied for their ability to adhere to explosive surfaces. An isotherm was constructed using HMX surface and trimethyl stearylammonium bromide in aqueous concentrations in the order of 1/10000 molar. The extent of the isotherm is limited only by the solubility of the ammonium salt in H2O. Other isotherms were constructed using the ammonium salt, stearyl alcohol, and stearic acid. The latter two compounds exhibited no affinity for organic surfaces when dissolved in benzene and toluene, but did show affinities for PbN6 surfaces. (Author)

AD-288 254 Div. 22
(TISTW/PCR) OTS price $1.10

Measurement Systems, Inc., Norwalk, Conn.
QUANTUM DETECTOR FOR MEASUREMENT OF EED BRIDGE WIRE TEMPERATURE RISE.
Monthly progress rept. no. 16, 1 Oct-31 Oct 62. 1 Nov 62, 2p. illus. (Rept. no. ER-7060)
(Contract N178-7934)
Unclassified report

DESCRIPTORS: *Bridges, Detectors, Temperature, Sensitivity, Electric detonators, Electric igniters, Wire.

AD-288 553 Div. 22, 10
(TISTW/PCR) OTS price $2.60

Aerojet-General Corp., Downey, Calif.
STUDY OF SUSCEPTIBILITY OF SOLID COMPOSITE PROPELLANTS TO EXPLOSION OR DETONATION.
Quarterly progress rept., 15 June-15 Sep 62, by T. G. Owe Berg, J. M. Cavallo and others. 15 Oct 62, 26p. incl. illus. tables, 38 refs.
(Rept. no. 0253-05(18)QP)
(Contract NOrd-18487)
Unclassified report

DESCRIPTORS: *Solid rocket propellants, Explosions, Explosives, Gases, Shock, Metals, Hydrazines, Perchlorates, Impact shock, Tests, Air, Test methods, Nitrogen, Oxygen, Argon, Nitrogen compounds, Oxides, Copper, Aluminum, Brass, Stainless steel, Nitric acid, Sensitivity, Detonation.

The feasibility of controlling the sensitivity of propellants, particularly by surrounding them with a suitable gas, is discussed. It is based on the arguments that shock in air produces certain species that are known to promote initiation of several explosives, and that this promoting effect occurs by chemical reaction on the surface of the explosive. The first step in a study of this type should then be to establish whether the sensitivity of a given explosive may be affected at all by controllable conditions are contact with a particular gas, contact with a particular metal, surface treatment with some material. (Author)

AD-288 674 Div. 22, 13
(TISTW/PCR) OTS price $4.60

Army Engineer Research and Development Labs., Fort Belvoir, Va.
AN ATTEMPT TO ISOLATE THE BLAST PHENOMENA WHICH CONTRIBUTE MOST TO THE EARTH-WALL FAILURE OF EXCAVATIONS,
by James E. Stilwell and Andrew J. Romano.
26 July 62, 39p. incl. illus. tables, 2 refs.
(Technical rept. no. 1717-TR)
(Proj. 8S12-95-001)
Unclassified report

DESCRIPTORS: *Blast, *Underground structures, *Explosion damage, Pressure, Vulnerability, Tests, Test methods, *Instrumentation, Photographs, Canada, Soils, Effectiveness.

A 100-ton high-explosive test at the Suffield Experimental Station is described. The objectives were: (1) to obtain an insight into the blast phenomena which contribute most to the failure of earth walls of excavations and (2) to determine the vulnerability of the two-man foxhole to blast considering the soil type existing at the Canadian test site. To accomplish these objectives, 11 test excavations were exposed to the blast at overpressure ranges of 15 psi, 25 psi, and 30 psi. The report concludes: (a) Damage to foxholes at the 15-psi overpressure level indicates that the incident blast wave and its reflections in the excavation are primarily responsible for earth-wall damage. (b) Damage to foxholes at the 25-psi overpressure level indicates that air-induced ground shock may be an important factor in earth-wall failure. (c) In the soil existing at the Canadian test site, the standard two-man foxhole showed, qualitatively, a high resistance to collapse from peak overpressures ranging up to 30 psi. (Author)

AD-288 678 Div. 22
(TISTW/PCR) OTS price $11.00

Midwest Research Inst., Kansas City, Mo.
DEVELOPMENT OF MARKING MATERIALS FOR MINE FIELD SITING AND RECORDING.
Final technical rept., 20 Apr 61-20 Feb 62, by J. W. Barger. 20 Feb 62, 142p. incl. illus. tables.
(Contract DA 44-009-eng-4773)
Unclassified report

DESCRIPTORS: *Markers, *Minefields, Minelaying, Mines, Land mines, Sublimation, Melting, Plants Toxicity, Foams, Phosphors, Flashlights, Odors, Aerosol generators, Paints, Rubber, Photographs, Recording devices, Aerial photography.

An extensive survey of sublimable solids and solidified liquids and gases was made to determine their acceptability as fugitive mine field markers. All materials with suitable disappearance rates were phytotoxic. A stable foam system was developed as a fugitive marker. These foams make a suitable mark for aerial mapping and disappear without leaving visual evidence. Known long-life phosphors were evaluated as visual markers for permanent identification of mine fields. No phosphors were found which would produce the required brightness for periods longer than 15 min. Various energy storage systems were explored without success. For night visibility three types of flashing lights were designed and developed. These lights were designed to have minimum cost and to be maintenance-free. In conjunction with the lights, a latex type stripping paint was developed as a daylight visual marker. Encapsulation of odorous materials was briefly explored. (Author)

AD-288 816 Div. 22
(TISTW/PCR) OTS price $2.60

Hughes Tool Co., Culver City, Calif.
THE HIPEG SYSTEM (20MM AIRCRAFT GUN MK 11 AND GUN POD EX 1).
Progress rept. for June 62.
June 62, 22p. incl. illus. tables (Rept. no. HTC-62-53)
(Contract NOrd-19180-c)
Unclassified report

DESCRIPTORS: *Aircraft guns, Reliability, Guns, Gun barrels, Failure (Mechanics), Tests, Test methods, Obturation, Life expectancy, Lubricants, Photographs.

Discussion covers the firing of rounds from the Mk-11 20-mm aircraft gun and the EX-1 gun pod. A description of stoppages, dynamic problems, and effectiveness of one piece barrels is presented.

AD-288 817 Div. 22
(TISTW/PCR) OTS price $1.60

Hughes Tool Co., Culver City, Calif.
THE HIPEG SYSTEM (20MM AIRCRAFT GUN MK 11 AND GUN POD EX 1).
Progress rept. for July 62.
July 62, 15p. incl. illus. tables (Rept. no. HTC 62-55)
(Contract NOrd-19180-c)
Unclassified report

DESCRIPTORS: *Aircraft guns, Reliability, Guns, Failure (Mechanics), Tests, Test methods, Firing mechanisms.

Approximately 12,000 rounds were fired during July. This quantity increases the total fired on the present program to 82,000 plus 32,000 rounds on the R&D program. There were a total of 22 stoppages during July. Over one-half of these were due to failures to resear. The rotary latches designed as a fix for the fail to resear functioned well in the R&D gun. Over 12,000 rounds were fired without a stoppage. When the mechanism was reproduced and installed in the reliability weapons, performance was not as good. The rotary latch is not completely positive and bounce-outs can occur. A new side latch approach is being investigated. It is a positive mechanical system but will require a new sear link. It is noteworthy that there were no gun mechanism stoppages during July. A complete record of the tests is presented. (Author)

AD-288 818 Div. 22
(TISTW/PCR) OTS price $2.60

Hughes Tool Co., Culver City, Calif.
THE HIPEG SYSTEM (20MM AIRCRAFT GUN MK 11 AND GUN POD EX 1).
Progress rept. for Aug 62.
Aug 62, 25p. incl. illus. tables (Rept. no. HTC-62-56)
(Contract NOrd-19180-c)
Unclassified report

DESCRIPTORS: *Aircraft guns, Reliability, Guns, Gun barrels, Failure (Mechanics), High explosive ammunition, Tests, Test methods, Photographs, Pneumatic systems.

Contents:
Firing program
Loader tests
Gun tests
Ammunition links
Pneumatic system
Ammunition
Reliability test stoppages

AD-288 880 Div. 22
(TISTW/PCR) OTS price $1.10

Army Armor Board, Fort Knox, Ky.
EVALUATION OF NYLON BALLISTIC SHIELD FOR M60A1 TANKS.
30 Oct 62, 2p. incl. illus.
(Proj. 2202-4)
Unclassified report

DESCRIPTORS: *Tanks, *Protective coverings, Tests, Test methods, Installation, Reliability, Photographs, Nylon.

A nylon ballistic shield was evaluated to determine its suitability for installation in the turret of the M60A1 tank. The shield was examined for physical characteristics, installation procedures, durability and reliability. As the result of these tests the US Army Armor Board concluded that the shield was satisfactory for use on the M60A1 tank.

AD-288 881 Div. 22, 7
(TISTW/RD) OTS price $1.10

Army Armor Board, Fort Knox, Ky.
EVALUATION OF LIGHT BULB ADAPTER FOR INSTRUMENT PANEL ON M60A1 TANKS.
1 Nov 62, 4p. incl. illus. (Proj. 2202-13)
Unclassified report

DESCRIPTORS: *Tanks, *Lighting equipment, *Adapters, *Tanks, Tests, Instrument panels.

AD-288 958 Div. 22
(TISTW/RD) OTS price $3.60

Miller Research Labs., Baltimore, Md.
PRODUCTION COMPONENTS FOR CARTRIDGE, 81 mm ILLUMINATING, T214E2.
Progress rept. for 1-30 June 62,
by E. R. Briggeman. 10 July 62, 34p. (Rept. no. PR-251-6-62)
(Contract DA 36-034-ORD-3468)
Unclassified report

DESCRIPTORS: *Illuminating projectiles, Cartridges, Projectiles, Production.

AD-288 959 Div. 22
(TISTW/RD) OTS price $3.60

Miller Research Labs., Baltimore, Md.
PRODUCTION ENGINEERING OF PLASTIC COMPONENTS FOR CARTRIDGE, 81 mm ILLUMINATING, T214E2.
Progress rept. for 1-31 May 62,
by E. R. Briggeman. 13 June 62, 29p. (Rept. no. PR-251-5-62)
(Contract DA 36-034-ORD-3468)
Unclassified report

DESCRIPTORS: *Illuminating projectiles, Cartridges, Projectiles, Production.

AD-288 997 Div. 22
(TISTW/RD) OTS price $1.10

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
DEVELOPMENT OF BROAD-BAND ELECTROMAGNETIC ABSORBERS FOR ELECTRO-EXPLOSIVE DEVICES.
Monthly progress rept. for 1-31 May 62,
by Paul F. Mohrbach and Robert F. Wood.
31 May 62, 4p. (Rept. no. P-B1857-11; NWL rept. no. 4-60)
(Contract N178-7913)
Unclassified report

DESCRIPTORS: *Electromagnetic waves, *Electromagnetic fields, *Detonation, Ferrites, Tables, Materials, Absorption, Safety, Hazards, Powder metals.

AD-289 063 Div. 22, 6, 12
(TISTW/RD) OTS price $3.60

Diamond Ordnance Fuze Labs., Washington, D. C.
THE ELECTRONIC OPTICAL SCORER,

by Donald J. Mary. 10 Oct 62, 34p. incl. illus. tables (DOFL rept. no. TR-1083)
(Proj. 30500) Unclassified report

DESCRIPTORS: *Firing error indicators, *Guided missiles (Air to air), *Detection, Towed bodies, Towing planes, Aerial targets, Training devices.

An Electronic Optical Scorer (EOS) was developed for installation in USAF MC-5, a rotating training target. The system is a dual-channel passive system designed to detect the obscuration of sunlit background caused by near passage of a missile and to broadcast an FM signal immediately and automatically if the miss-distance is less than 15 ft. The signal is presented by an FM receiver at the monitoring station as a varying frequency tone; no data-processing equipment is required. Four units were fabricated. Ground tests in a stationary target demonstrated the scorer's ability to properly indicate the miss-distances. In a flight test in a MC-5 target, a continuous hit signal was transmitted. The spurious signal was attributed to scanning of the horizon line by the multilobed detection patterns as the target rotated. The EOS as designed was accepted for trial in the TDU-9/B, a nonrotating target. (Author)

AD-289 090 Div. 22
(TISTW/PCR) OTS price $1.10

Miller Research Lab., Baltimore, Md.
PRODUCTION COMPONENTS FOR CARTRIDGE, 81MM ILLUMINATING, T214E2.
Monthly progress rept., 1-31 Oct 62,
by E. R. Briggeman. 8 Nov 62, 5p. (Rept. no. PR-251-10-62)
(Contract DA 36-034-ORD-3468)
Unclassified report

DESCRIPTORS: *Illuminating projectiles, Tests, Test methods, Documentation, Ballistics, Production.

AD-289 262 Div. 22, 30
(TISTW/PCR) OTS price $1.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
BRL TIME-OF-ARRIVAL BLAST GAGE,
by G. T. Watson and R. D. Wilson. Aug 62, 18p. incl. illus. (Technical note no. 1476)
(Proj. 503-04-002)
Unclassified report

DESCRIPTORS: *Piezoelectric gages, *Gages, *Blast, Theory, Manufacturing methods, Shock, Photographs, Drafting, Equations, Measurement.

Principles and constructional details are given for a piezoelectric time-of-arrival blast gage. Using these gages in pairs to measure shock arrival times, peak blast overpressure of the shock front can be inferred from a velocity measurement by means of the Rankine-Hugoniot equation. (Author)

AD-289 284 Div. 22
(TISTW/PCR) OTS price $2.60

4750th Test Squadron (Tactics and Application Engineering) Tyndall Air Force Base, Fla.
MB-1 EJECTOR RACK PRELOAD.
Final rept.,
by Peter F. Bayer. 17 Aug 62, 21p.
(Proj. ADC/73AD-62-14)
Unclassified report

DESCRIPTORS: *Missile launchers, *Rocket launchers, Torque, Design, Tests, Test methods, Aircraft ammunition, Rockets, Airborne.

This project was conducted at Tyndall AFB, Fla., 22-25 May 62 in support of an investigation of the MB-1 Ejector Rack Preload Torque problem. The specific problem concerned preload torque of MB-1 ejector rack hook release mechanism. Primary purpose of the test was to establish a present preload torque which would eliminate torquing of the preload bolt at each weapon loadings. As a result of limited information obtained from this test, it was concluded that a preset preload torque could not be established due to exceeding torque variations obtained during weapon loadings. (Author)

AD-289 336 Div. 22, 9
(TISTP/WH) OTS price $6.60

Broadview Research Corp., Burlingame, Calif.
EFFECTS OF TOPOGRAPHY ON DYNAMIC PRESSURE.
Final rept.,
by Norman R. Wallace. Aug 62, 68p. incl. illus. tables, 10 refs. (Rept. no. URS B170-10)
(Contract DA 49-146-XZ-050)
(DASA-1323) Unclassified report

DESCRIPTORS: *Explosions, *Shock waves, *Pressure, *Terrain, *Terrain models, *Blast.

The effects of topography on the dynamic pressure of shock waves in air are investigated. Most of the new work dealt with analysis of the influence of plane slopes on the dynamic pressure of plane, flat-topped shock waves incident on the slopes at 0 azimuth. These conditions differ from those of the previous experimental studies in which spherically expanding shocks with pressure decay behind the shock front were incident on the slopes. However, many of the more interesting effects on dynamic pressure occur near enough in time to the shock front that results for a plane shock carry over without modification to the case of a blast wave. A discussion of the application of plane shock results to prediction of blast waves is included in each section dealing with the analysis of plane shocks. (Author)

AD-289 352 Div. 22, 8
(TISTW/RD) OTS price $3.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
HERO SUPPORTING STUDIES.
Monthly progress rept. no. 1, 30 June-31 July 62,
by Norman P. Faunce and Paul F. Mohrbach.
31 July 62, 24p. incl. illus. (Rept. no. P-B1980-1)
(Contract N178-8102)
Unclassified report

DESCRIPTORS: *Electromagnetic fields, *Electromagnetic waves, *Radiofrequency, *Detonation, *Electric Detonators, Electric Igniters, Radiofrequency attenuators, Sensitivity, Tests, Hazards.

Effort during this initial period was assigned to planning the procedures to be followed in the component testing phase. A preliminary test scheme is developed, which will trigger the start of item evaluations. Means for forming half-cylinder attenuator assemblies were developed. These half-plugs are designed to be assembled to an EED to reduce its sensitivity to RF. Units presently developed increase the length of a MK 1 MOD 0 squib by about one third, and have about 16 db attenuation at 200 mc.

There was some progress in the development of instrumentation. A new system for evaluating matched attenuation, and means to measure more accurately the power delivered to a squib termination occupy our initial attention. (Author)

AD-289 365 Div. 22, 30
(TISTW/PCR) OTS price $1.00

Ballistic Research Labs., Aberdeen Proving Ground, Md.
BRL SHOCK TUBE PIEZO-ELECTRIC BLAST GAGES,
by Benjamin A. Granath and George A. Coulter.
Aug 62, 39p. incl. illus. table, 10 refs.
(BRL technical note no. 1478)
(Proj. 503-04-002)
Unclassified report

DESCRIPTORS: *Gages, *Piezoelectric gages, Shock tubes, Production, Tests, Pressure, Time, Recording systems, Calibration, Errors, Drafting, Blast.

Two small piezo-electric blast gages of one-half inch and one-quarter inch case diameters are described. The details of construction, testing, and use of these two gages are given. In addition, two modifications of the one-half inch gage and an experimental three-quarter inch gage are described and evaluated. Pressure time records from these gages are given. (Author)

AD-289 370 Div. 22, 12
(TISTW/RD) OTS price $6.60

Air Force Special Weapons Center, Kirtland Air Force Base, N. Mex.
AN EARTH TRAJECTORY MODEL FOR SUBSURFACE BALLISTIC AND THRUSTED VEHICLES,
by Phyllis B. Chisholm, Francis L. Pugh and Robert M. Pelzl. Sep 62, 66p. incl. illus. tables, 6 refs. (Rept. no. AFSWC TDR 62-106)
(Proj. 5797)
Unclassified report

DESCRIPTORS: *Earth models, *Ballistics, *Soils, Drag, Density, Mathematical analysis, Digital computers, Pressure, Plasticity, Soils, Penetration

A preliminary digital computer model is developed to describe the straight line motion of a body of revolution through the earth's subsurface. Drag forces resulting from soil displacement, time rate of soil strain, and kinetic friction are estimated. The following major assumptions are included: (1) The vehicle is a rigid undistorted body, (2) Major drag contribution is from the vehicle nose, (3) Homogeneous soil is subjected to plastic deformation, (4) Total soil pressure due to soil displacement and velocity acts normal to the vehicle surface, and (5) Any wave motion imparted to the soil is neglected. Drag components of normal pressure are integrated over the vehicle nose at each time instant and the resulting motion integrated with time to obtain trajectory predictions. (Author)

AD-289 444 Div. 22
(TISTW/RD) OTS price $1.10

Army Artillery Board, Fort Sill, Okla.
EVALUATION OF UNIVERSAL FUZE SETTER, XM31E1 (HAND OPERATED).
July 62, 4p. illus. (Proj. no. FA 1462)
Unclassified report

DESCRIPTORS: *Fuze setters, Fuzes, Mortar fuzes.

AD-289 447 Div. 22
(TISTW/RD) OTS price $1.10

Measurement Systems, Inc., Norwalk, Conn.
QUANTUM DETECTOR FOR MEASUREMENT OF EED BRIDGE WIRE TEMPERATURE RISE.
Monthly progress rept. no. 13, 1-31 July 62. 1 Aug 62, 5p. (Rept. no. ER-7053)
(Contract N178-7934)
Unclassified report

DESCRIPTORS: *Electromagnetic fields, *Igniters, *Temperature, Safety, Wire, Detonators, Hazards, Detection.

AD-289 531 Div. 22, 6
(TISTW/RD) OTS price $16.50

Army Engineer Research and Development Labs., Fort Belvoir, Va.
PROCEEDINGS, SYMPOSIUM ON DETECTION OF UNDERGROUND OBJECTS, MATERIALS AND PROPERTIES, 19-20 MARCH 1962, HELD AT U.S. ARMY ENGINEER RESEARCH AND DEVELOPMENT LABORATORIES, FORT BELVOIR, VIRGINIA,
by Stephen E. Dwornik. 1962, 252p. incl. illus. tables, refs.
(Proj. 8F07-04-001-06)
Unclassified report

DESCRIPTORS: *Land mines, *Symposia, *Underground structures, Spectrophotometers, Scattering, Radiometers, Instrumentation, Archaeology, Magnetometers, Underground explosions, Nuclear explosions, Infrared photography, Soils, Mapping, Detection.

Contents:
Mine detection problem statement
Geochemical and other auras of influence and the detection of underground objects
Range calculation for the active magnetic object locator
Two years of Vela Uniform
Variations in reflectance properties of soils and vegetation
Resolution improvement by post-detection filtering
Airborne geoscience research
Computer analysis of spectrophotometric data as an aid in optimizing photographic tone contrast
Detection of underground objects by backscattered radiation
Microwave radiometry
Underground detection methods of exploration geophysics
Paper for underground detection symposium
Detection of transient stresses and strains in soil
Electromagnetics in review

AD-289 569 Div. 22
(TISTW/RD) OTS price $3.60

Institute of Metals and Explosives Research, U. of Utah, Salt Lake City.
IONIZATION IN THE SHOCK INITIATION OF DETONATION,
by Alan Bauer, Melvin A. Cook and Robert T. Keyes.
15 Sep 62, 28p. incl. illus. table, 27 refs.
(Contract AF 18(603)100)
Unclassified report

DESCRIPTORS: *Explosives, *Detonation, Gas ionization, Plasma physics, Transport properties, Pentolite, Rotating mirror cameras, Pressure, Ionization, Shock waves.

Conduction-time (or distance) curves measured by both the parallel and perpendicular probe methods in receptors of the card gap, SPHF plate and plate impact methods of sensitivity are

correlated and compared with the pressure-time (or distance) curves obtained by the aquarium method. Results indicate that detonation is initiated by a shockwave only upon establishment of (dilute) plasma conditions in the shock front. The ionization wave that establishes this coincidence is initiated at the inert barrier or SPHF plate after a time following transmission of the shock into the receptor. After formation, requiring a finite time, the ionization wave builds up in intensity at the SPHF plate, flashes forward into the receptor charge and apparently triggers detonation (at the instant of arrival of a critical level of ionization) at the shock front. Therefore, the pressure in the shock front, while an important factor in the shock initiation of detonation, may not be the only, or even the most important one; strong ionization may also be an essential factor. Shock initiation of detonation appears to require the development of a strongly ionized reaction shock. (Author)

23. PERSONNEL AND TRAINING

AD-287 932 Div. 23, 16
(TISTB/MD) OTS price $1.60

Armed Forces-NRC Vision Committee, Washington, D. C.
FEASIBILITY OF DESCRIBING VISUAL DEMANDS OF MILITARY JOBS,
ed. by Victor Fields. Oct 62, 10p.
(Contract Nonr-230005)
Unclassified report

DESCRIPTORS: *Visual acuity, *Job analysis, Color vision, Standards, Dark adaptation, Military personnel, Officer personnel, Feasibility studies, Space perception, Military requirements.

The military services recognize the need to determine the visual demands of military jobs or billets. This need is not being met adequately at the present time. Appealing to vision experts for advice on the setting of visual standards in the military services is useless without information about the purposes for which the standards are needed, the policies of the respective agencies with regard to retirement, retention, and assignment of personnel, and the maximum visual demands placed upon incumbents of specific jobs or families of jobs. It is recommended that a new working group be established to define and evaluate objective methodologies which would be appropriate to the Armed Forces in delineating visual demands in the performance of military jobs. (Author)

AD-288 045 Div. 23
(TISTP/MS) OTS price $1.60

6570th Aerospace Medical Research Labs., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
SOME MOTION CHARACTERISTICS OF TETHERED FREE-FLOATING WORKERS,
by Edward J. Schlei, Paul L. Vergamini and John C. Simons. Oct 62, 12p. incl. illus. 4 refs.
(AMRL memo. P-13)
Unclassified report

DESCRIPTORS: *Aviation personnel, *Man, *Weightlessness, Motion, Rotation, Configuration, Control, Maintenance personnel, Space flight, Spaceships.

The freedom of movement of a free-floating and weightless operator who is tethered to a spacecraft is described. The intent is to determine in what manner a lifeline limits his six degrees of motion freedom and if limitations do exist to suggest schemes by which man can be tethered with minimum restrictions. The operator's motion behavior as he soars along a tether stretched between two weightless masses is also described. Orbital motions of the two bodies, tether physical characteristics and harness attachments on the operator are not considered. (Author)

AD-288 167 Div. 23
(TISTB/SAT) OTS price $1.60

Ohio State U., Columbus.
ADMINISTRATIVE PRACTICES IN UNIVERSITY DEPARTMENTS,
by Eugene Haas and Linda Collen. 30 Aug 62, 14p.
(Contract AF 49(638)447)
(AFOSR 2985) Unclassified report

Paper presented at the annual meeting of the American Sociological Association, Washington, D. C., August 30, 1962.

DESCRIPTORS: *Education, Research program administration, Universities.

AD-288 251 Div. 23
(TISTB/MS) OTS price $2.60

Human Resources Research Office, Washington, D. C.
APPLICATION OF A METHOD OF EVALUATING TRAINING. Research memo.,
by John A. Cox. Nov 62, 17p. incl. illus. 1 ref.
(Contract DA 44-188-ARO-2)
Unclassified report

DESCRIPTORS: *Training devices, *Teaching machines, Test methods, Costs, Test equipment, Training, Personnel, Operations research, Analysis, Effectiveness.

While considering methods of evaluating training devices, a technique was found which has been proposed by Edwards. This method incorporates proficiency gain, worth of training, and cost estimates into a single figure. Such simplicity holds marked appeal, but the method has not been used, as far as can be determined. Edwards' method was modified slightly to produce figures thought to be somewhat more suitable for use in the over-all Army situation. The revised method now produces a minimum and a maximum estimate of gain, in terms of dollars. This paper reports the processing of data collected in a teaching situation by the Edwards technique, as modified for Army situations. This memorandum can serve two functions. First it is a record of research activity. Second, it can be used as a model for training personnel to follow when testing some part of a training program. (Author)

AD-288 421 Div. 23, 28
(TISTB/CCH) OTS price $16.00

American Foundation for the Blind, New York, N. Y.
PROCEEDINGS OF THE MOBILITY RESEARCH CONFERENCE, WASHINGTON, D. C., SEPTEMBER 25, 1961 AND MASSACHUSETTS INSTITUTE OF TECHNOLOGY, OCTOBER 11-13, 1961,
ed. by James W. Linsner. May 62, 239p.
Unclassified report

DESCRIPTORS: *Conferences, *Adjustment (Psychology), Attitudes, Sensory perception, Visual thresholds, Auditory perception, Blindness.

Division 23 - PERSONNEL AND TRAINING

AD-288 440 Div. 23
(TISTB/SAT) OTS price $3.60

Human Resources Research Office, George Washington U., Washington, D. C.
THE RELATION BETWEEN RADAR DETECTION AND THE OBSERVER'S CONCEPT OF A TARGET.
Research memo.,
by Robert D. Baldwin, A. Dean Wright, and Donald J. Lehr. June 62, 31p.
Unclassified report

DESCRIPTORS: *Radar, *Radar targets, Military personnel, Radar detection, Training, Simulation.

AD-288 586 Div. 23
(TISTB/LMH) OTS price $1.60

System Development Corp., Santa Monica, Calif.
DESIGN EDUCATION IN INDUSTRY,
by Warren J. Pelton. 1 Aug 62, 10p. incl. illus. (Rept. no. SP-907)
Unclassified report

Paper presented at the Engineering Design Conference, 5-7 Sep 1962, at University of California, Los Angeles.

DESCRIPTORS: *Operations research, *Industrial training, Data processing system, Information theory, Management engineering, Design.

Reports that lack of adequate documentation were a major drawback to the establishment of an extensive course in the field of information-processing system design. SDC has, however, structured a curriculum for individuals with academic backgrounds including doctor's degrees (in fields ranging from electrical engineering through clinical psychology) who will be doing design work. Describes the four modules of which this curriculum is composed, and presents six methods of presenting system analysis and design data. (Author)

AD-289 389 Div. 23
(TISTB/LMH) OTS price $1.60

Naval School of Aviation Medicine, Pensacola, Fla.
EVALUATION OF NROTC AVIATION CRUISE OF 1960--ADVANCED TRAINING,
by Dale A. Wise and Richard C. DeWalt.
15 June 62, 15p. incl. table, 5 refs. (Special rept. no. 62-3)
Unclassified report

DESCRIPTORS: *Naval personnel, *Training, *Naval aviation, Attitudes, Needs, Effectiveness, Aviation personnel, Reaction (Psychology), Officer personnel, Naval reserve.

An aviation attitude survey was administered to 1140 NROTC Midshipmen upon their arrival in the Naval Air Advanced Training Command for the NROTC aviation summer cruise of 1960. The same test was re-administered to the midshipmen at the conclusion of their cruise. The change in attitudes from the initial administration of the test to the last was used to determine the effectiveness of the summer cruise in influencing positive attitudes towards aviation. In addition to the attitude survey, a questionnaire for evaluating the cruise was presented to the midshipmen at the end of their cruise. The results from the attitude surveys demonstrated that the experience of the cruise did effect a more favorable attitude towards aviation. The actual flight experience was rated as the most effective aspect of the cruise in the cruise evaluation questionnaire. (Author)

AD-289 391 Div. 23
(TISTB/LMH) OTS price $1.10

Naval School of Aviation Medicine, Pensacola, Fla.
EVALUATION OF NROTC AVIATION CRUISE OF 1961--ADVANCED TRAINING,
by Dale A. Wise. 18 June 62, 6p. incl. 1 table, 1 ref. (Special rept. no. 62-4)
Unclassified report

DESCRIPTORS: *Naval personnel, *Training, *Naval aviation, Needs, Effectiveness, Aviation personnel, Reaction (Psychology), Naval reserve, Officer personnel, Attitudes.

The purpose was to evaluate the flight indoctrination program for NROTC midshipmen conducted during the summer of 1961 at the Naval Air Advanced Training Command. A comparison with findings from 1960 was also made. The evidence reported supports the following conclusions: (1) the 1961 NROTC cruises can be considered successful; (2) results indicate a more enthusiastic reaction by the 1961 group than by the 1960 group; (3) multi-engine aircraft were not popular among the students; (4) the career lectures were cited as most beneficial by the students, but the technical curriculum was not considered too worthwhile because of redundancy; and (5) the peer rating system in use was extremely unpopular with the students. Recommendations were that (1) an increase in single engine flight time would increase the students' enthusiasm, (2) increasing the number of career lectures and decreasing the technical lectures are recommended, and (3) an improvement in the peer rating system is needed. (Author)

AD-289 392 Div. 23, 6
(TISTW/RD) OTS price $2.60

Bureau of Naval Personnel, Washington, D. C.
A CHECK LIST FOR USE BY A TRAINER-EVALUATOR TO ASSESS SONARMAN PROFICIENCY ON TEST EQUIPMENT,
by Alvin J. Abrams and Edward J. Pickering.
July 62, 19p. incl. illus. 6 refs. (Technical bulletin 62-7)
(In cooperation with Naval Personnel Research Activity, San Diego, Calif.)
Unclassified report

DESCRIPTORS: *Sonar personnel, *Training, *Test equipment, Training devices, Electronic equipment.

The development, feasibility, value and implementation of the Test Equipment Trainer-Evaluator Check List for Sonarmen are discussed. This trainer-evaluator is designed to identify sonarman training needs and to provide a means of immediate corrective training. It is administered by a sonar supervisor while a sonarman is performing five of the regular POMSEE checks on shipboard sonar sets, and its results indicate to both the supervisor and the trainee specific performance weaknesses and training needs. This check list is a pilot instrument. Although it is intended only for sonarmen, similar check lists, developed specifically for other electronic ratings, would be feasible and valuable for shipboard training. (Author)

AD-289 393 Div. 23, 8
(TISTB/MS) OTS price $4.60

Bureau of Naval Personnel, Washington, D. C.
EXPERIMENTAL TRAINING OF SONARMEN IN THE USE OF ELECTRONIC TEST EQUIPMENT. III. THE EVALUATION

OF THE EXPERIMENTAL PROGRAM,
by Edward J. Pickering and Alvin J. Abrams.
July 62, 35p. incl. tables, 6 refs. (Technical bulletin no. 62-8)
(In cooperation with Naval Personnel Research Activity, San Diego, Calif.)
Unclassified report

DESCRIPTORS: *Sonar personnel, *Maintenance, *Electronic equipment, Test equipment, Training.

An experimental Basic Test Equipment Training Program which was developed through the cooperative effort of research and training personnel is evaluated. The principal conclusion was that students trained under the experimental program performed significantly better than students trained under the previous program. As a result, the Fleet ASW School, San Diego, has introduced this program into the maintenance training phase of its basic sonarman courses. The materials and techniques developed for this program could be utilized in teaching test equipment in other Navy schools. If this is done, the second report of this series (4), which describes all of the training materials, should be used as a guide. (Author)

AD-289 394 Div. 23, 6
(TISTW/RD) OTS price $4.60

Bureau of Naval Personnel, Washington, D. C.
EXPERIMENTAL TRAINING OF SONARMEN IN THE USE OF ELECTRONIC TEST EQUIPMENT. IV. DIAGNOSTIC TEST RESULTS FOR ADVANCED SONAR STUDENTS,
by Alvin J. Abrams and Edward J. Pickering.
July 62, 36p. incl. tables, 6 refs. (Technical bulletin no. 62-9)
(In cooperation with Naval Personnel Research Activity, San Diego, Calif.)
Unclassified report

DESCRIPTORS: *Sonar personnel, *Training, *Test equipment, Electronic equipment, Maintenance, Sonar equipment.

The test performance is described of sonarmen graduates of the AN/SQS-4 Maintenance Course at the Fleet ASW School, San Diego. These sonarmen were tested on their use of five common test equipments and the Instruction Book for the AN/SQS-4 and AN/SQS-4A Sonar Sets. Because of the elementary nature of the performance tasks, it was thought that a standard requiring 90% of the graduates to master each test item would be reasonable. This standard was not met by the sonarmen in the sample on a large proportion of the items. The findings were reviewed with administrative personnel at the school and the results were considered in a recent course revision. With respect to the revised course, it is recommended that (a) school instructors continue to evaluate the test equipment performance of graduates to determine whether proficiency has reached the desired level, and (b) if a performance deficiency still exists, training materials developed for use in the basic sonarman course (3) be utilized. It is also recommended that students be required to make more frequent and varied use of maintenance instruction books during training. (Author)

AD-289 395 Div. 23, 8
(TISTB/MS) OTS price $7.60

Bureau of Naval Personnel, Washington, D. C.
EXPERIMENTAL TRAINING OF SONARMEN IN THE USE OF ELECTRONIC EQUIPMENT. II. EXPERIMENTAL TRAINING MATERIALS,
by Edward J. Pickering and Alvin J. Abrams.
July 62, 1v. incl. illus. 9 refs. (Technical bulletin no. 62-10)
(In cooperation with Naval Personnel Research Activity, San Diego, Calif.)
Unclassified report

DESCRIPTORS: *Sonar personnel, *Maintenance, *Electronic equipment, Test equipment, Training.

In July of 1960 this Activity undertook the development of an experimental training program aimed at enhancing the proficiency of sonar school graduates in the use of electronic test equipments. This report contains copies of all the training materials which were developed for use in the experimental program. These materials are designed for use in teaching basic applications of the Volt-Ohm-Milliameter (PSM-4 or Simpson 260), Oscilloscope (OS-8C/U), and Tube Tester (TV-3B/U or -10/U). These materials represent a complete package which can be used by other Naval Commands that are engaged in training personnel in the basic uses of these specific test equipments, or the general concepts involved can be incorporated into training materials for use in training courses involving other test equipments. (Author)

24. PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES

AD-287 960 Div. 24
(TISTP/FR) OTS price $2.60

Aeronautical Chart and Information Center,
St. Louis, Mo.
UNIVERSAL MULTIPLE VIDEO MAPPER (AN/GPA-70) CHART PRODUCTION TECHNIQUES,
by Edward J. Kastanek. June 62, 62p. incl. illus. (ACIC reference publication no. 1)
Unclassified report

DESCRIPTORS: *Display systems, Plan position indicators, Radar images, Maps, Photographic film.

The multiple-plate feature of the AN/GPA-70 Video Mapper, by providing for instant switching from one plate to another, enables the radar control operator to immediately adapt the chart image on his scope to the situation. The chart images are stored, in miniature, on 35mm film, on a series of turret assemblies, from which the selected frame is automatically positioned and optically projected to the viewing surface of the scope. The preparation and production of the 'Aeronautical Video Charts' and their processing for use as an integral part of the AN/GPA-70 equipment is a highly technical and precision operation. Descriptions and illustrations explain the techniques, materials and equipment involved. (Author)

AD-288 982 Div. 24
(TISTP/WH) OTS price $3.60

Manchester U. (Gt. Brit.).
RESEARCH STUDY AND DEVELOPMENT OF SOLAR PHOTOGRAPHIC FILTERS.
Final rept.,
by R. Beer. Oct 61, 34p.
(Contract AF 61(052)395)
(AFCRL 62-654) Unclassified report

DESCRIPTORS: *Photographic filters, *Sun.

25. PHYSICS

AD-287 904 Div. 25
(TISTP/WH) OTS price $3.60

Northeastern U., Boston, Mass.
AN APPROXIMATE THEORY FOR THE DESIGN AND OPERATION OF A TRAPEZOIDAL CROSS-SECTION FLUX CONCENTRATOR,
by George Raymond Peacock and Giovanni Lanza.
June 62, 31p. incl. illus. table, 10 refs.
(Scientific rept. no. 2)
(Contracts AF 19(604)7358, AF 19(604)8462 and AF 49(638)555), Proj. 6694)
(AFCRL 62-801) Unclassified report

DESCRIPTORS: *Transformers, *Electromagnetic fields, *Magnetic fields, *Magnetic cores, Configuration, Design.

A simple theory describing the operation of a pulsed magnet coil known as the Flux Concentrator is presented. Based on elementary circuit theory it is compared to data obtained from an experimental model. Maximum field strength is shown to be predicable to 10-20%, as also are the field geometry and important circuit parameters. (Author)

AD-287 906 Div. 25, 1
(TISTP/JW) OTS price $10.50

New Mexico U. Engineering Experiment Station, Albuquerque.
SOME DESIGN CRITERIA FOR OPEN-ENDED MICROWAVE CAVITIES,
by Richard O. Gilmer and Donald C. Thorn.
June 62, 124p. incl. illus. tables, 19 refs.
(Technical rept. no. EE-65)
(Contract DA 29-040-ORD-1238)
Unclassified report

DESCRIPTORS: *Cavity resonators, *Microwaves, Design, Dielectric properties, Velocity, Fluid flow, Waveguides, Aerodynamics.

The electromagnetic problems involved in determining the proper waveguide size for the TE cavity and its terminations are described, as well as construction techniques used in the construction of open-ended sampling cavities. The approach one may use for aerodynamic improvements of the cavities is discussed, but no conclusions can be drawn about the design's validity since no experimental tests were taken. (Author)

AD-287 908 Div. 25
(TISTP/WH) OTS price $4.60

Institute of Mathematical Sciences, New York U., N. Y.
THE THREE-DIMENSIONAL INVERSE SCATTERING PROBLEM,
by Irvin Kay. July 62, 39p. (Research rept. no. EM-174)
(Contract AF 19(604)3495, Proj. 5631)
(AFCRL 62-504) Unclassified report

DESCRIPTORS: *Scattering, *Electrons, *Plasma physics, *Electromagnetic wave, Ionization, Density.

A concrete form for the mathematical theory of an inverse scattering problem is presented which was originally formulated in quantum mechanical terms. The problem is related to determining the variation of electron density in an ionized gas such as the earth's ionosphere by means of radio sounding experiments. The definitions and proofs of theorems have been revised in an attempt to make the analysis understandable to a reader who may not be familiar with the terminology of quantum mechanics or of the associated Hilbert space theory. While the usual terminology employed by physicists has not been discarded completely, definitions and relations are given in concrete terms whenever possible, and abstract relations are used for convenience of notation rather than for the purpose of obtaining great generality. The physical problem at which the present work is aimed is to find the variation of electron density in a weakly ionized gas from a knowledge of the scattering amplitude resulting from the incidence of a plane electromagnetic wave. It is assumed that the relevant properties of the medium vary slowly enough so that a scalar wave describes the scattering phenomena with sufficient accuracy. it is also assumed that losses, ordinarily attributed to the collisions of the electrons with heavy particles may be neglected. The effect of an external magnetic field which would cause anisotropy is neglected as well, so that the scattering is assumed to be isotropic as well as lossless. (Author)

AD-287 912 Div. 25
(TISTP/JW) OTS price $4.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
MAGNETOHYDRODYNAMIC STABILITY OF A TOROIDAL PLASMA STRUCTURE,
by Jeffrey Freidberg. 10 May 62, 42p. incl. illus. 8 refs. (Research rept. no. PIBMRI-1025-62)
(Contract AF 30(602)2149)
(RADC TDR 62-284) Unclassified report

DESCRIPTORS: *Plasma physics, *Stability, *Magnetohydrodynamics, Magnetic fields, Ionization, Motion, Perturbation theory.

Before thermo nuclear energy can be safely and efficiently harnassed, the problem of confining the 'hot plasma' must first be solved. The solution to this problem involves a complete investigation of both the microscopic and macroscopic instabilities, which arise when the attempt is made to confine a plasma by magnetic fields. The objective of this study is to macroscopically treat the problem of stability in a specific plasma configuration. There are numerous possibilities for different types of stabilities and instabilities which can arise in the given configuration. However, only one mode of plasma motion is considered. The results of the investigation indicate that for this mode the plasma is stable under a great variety of perturbations. Under certain conditions, the plasma is found to be unstable. The nature of the instability is such that the plasma drifts through the confining magnetic field. (Author)

AD-287 916 Div. 25, 31
(TISTM/BRW) OTS price $11.50

Southwest Research Inst., San Antonio, Tex.
ELASTO-PLASTIC RESPONSE OF PLATES UNDER UNIFORM PRESSURE.
Final rept.,
by R. Kirk Gregory, Thein Wah, and Robert C. DeHart. 9 Feb 62, 146p. incl. illus. tables, 12 refs.
(Contract NObs-78725)
Unclassified report

DESCRIPTORS: *Metal plates, *Ship plates, Steel, Stresses, Deformation, Elasticity, Plasticity, Deflection, Strain gages, Test equipment, Microscopes, Tests, Theory, Load distribution.

The behavior of ship plating which is laterally loaded beyond the elastic limit was investigated. Forty-eight plate experiments were conducted involving 3 different steels, HY80, HT, and SAE 1018. For each steel type, 4 thicknesses and 4 aspect ratios were used. Strains, deflections, rotations, and edge displacements for the plates were measured as the lateral pressure was increased to selected levels, removed, and reapplied several times. Clamped edge conditions with specific restraint to in-plane edge displacement were also used. The experimental results are presented and compared in several ways with the theory (Thein Wah, ASCE Proceedings Paper 1822; Journal of Ship Research, 4:17, 1960; and Journal of Ship Research, 5:16, 1961). The manner in which plastic regions develop was determined experimentally and compared with the assumptions used in developing the theory. (Author)

AD-287 920 Div. 25
(TISTM/EJH) OTS price $5.60

Wayne State U., Detroit, Mich.
EXTENSION OF THE RAYLEIGH-GANS THEORY FOR SPHERICAL AND SPHEROIDAL PARTICLES,
by Cuichi Ikeda. 15 Oct 62, 55p. incl. illus. tables (Technical rept. no. 2(48)
(Contract Nonr-351100)
Unclassified report

DESCRIPTORS: *Particles, *Light, *Optics, Spheres, Molecules, Polarization, Electromagnetic waves, Theory, Mathematical analysis, Scattering.

Equations arrived at allow quantitative use of the phenomenon of depolarization of nonspherical particles and, ultimately, information on the shape of nonspherical particles and rigid molecules in resting and streaming solutions.

AD-287 923 Div. 25
(TISTP/WH) OTS price $2.60

Air Force Cambridge Research Labs., Bedford, Mass.
PLASMA BEHAVIOR IN A ROMAC MAGNETIC FIELD.
Research rept.,
by L. S. Combes, C. C. Gallagher, and M. A. Levine. July 62, 17p. incl. illus. table, 9 refs. (Rept. no. AFCRL 62-810)
Unclassified report

DESCRIPTORS: *Plasma physics, *Magnetic fields, *Magnetic pinch.

A plasma containment device entitled Romac (ROtated MAgnetic Cusp) was constructed. An attempt was made to combine the basic stability advantages of four-pole line cusp with the low loss rate of a mirror field. The magnetic field for Romac was produced by adding a mirror field orthogonally to the cusp field. Using pulse techniques an ionized gas was created within a biconical chamber and the Romac magnetic field produced transiently with the mirror field along the axis of the chamber (Z axis) and the cusp field in the X-Y plane. Measurements with magnetic probes and light pipes show that a disturbance in the magnetic field, accompanied by an increase in light intensity, started at the periphery of the plasma chamber and was propagated inward at two velocities to the central axis. Detailed measurements were made on the magnetic field configuration. These indicate that, at the time the second wave arrived at the axis, the mirror field had been to a large extent separated from the cusp field so that mostly mirror field existed throughout the central region, while mostly cusp field existed in the outer region. The intensity of the field at this time in the central region indicates that the cusp field was compressing the plasma and mirror field so that the intensities of the mirror field in this region were even larger than the maximum intensity of the applied mirror field. (Author)

AD-287 940 Div. 25, 2
(TISTE/CAM) OTS price $2.60

Ghana U. (Africa).
A ROTATING AERIAL BACK-SCATTER SOUNDER.
Technical note no. 4 on Equatorial Study of Irregularities in the Ionosphere,
by B. R. Clemesha. 10 Aug 62, 11p. illus.
(Contract AF 61(052)421)
(AFCRL 62-903) Unclassified report

DESCRIPTORS: *Radio waves, *Ionosphere, *Antennas, *Plan position indicators, *Electronic recording systems, *Electromagnetic wave reflections, Display systems, Servo systems, Reflection, Antenna radiation patterns, Measurement, Scattering, Electronic switches, Programming, Polarization.

A description is given of a back-scatter sounder designed to investigate echoes scattered from F region irregularities associated with equatorial spread F. Topics of special interest are: (1) general design considerations; (2) aerial control unit; (3) sounder, display, and recording equipment; (4) program unit; and (5) aerial radiation pattern. (Author)

AD-287 946 Div. 25, 2
(TISTP/FR) OTS price $1.60

Technische Hochschule, Hanover (Germany).
SELF-INTERACTION OF LONGITUDINAL PLASMA OSCILLATIONS WITH GENERATION OF ELECTROMAGNETIC RADIATION. APPLICATION TO THE NARROW-BAND RADIO BURSTS OF THE SUN.
Technical note no. 2 on The Electro-Magnetic Irradiation by Longitudinal Plasma-Oscillations within a Medium that is Neither Affected by an External Magnetic Field Nor by Flows of the Plasma as a Whole,
by R. W. Larenz. 1 July 62, 12p. incl. illus.
(Contract AF 61(052)161)
(AFCRL 62-787) Unclassified report

Presented at the Symposium on Electromagnetic Theory and Antennas, June 1962, Copenhagen.

DESCRIPTORS: *Plasma physics, Electric fields, Magnetic fields, Electromagnetic waves, Plasma oscillations, Extraterrestrial radio waves, Sun.

Concerning linearily coupled longitudinal and transversal rf waves, the difficulty of separation of the transversal part to get radiation out of the plasma, and the lack of a substantial source of radiation, because these waves are representing free plasma wave modes, are discussed. It is shown that nonlinear interaction of space charge waves yields a radiation source of pure transversal waves, which at the second harmonic of the plasma frequency can run through the plasma and leave it. Formulae of the radiation field at large distances from the source are given and applied to the narrow band solar bursts. The observed exhibition of the second harmonic as well as the spectral energy distribution can easily be explained. (Author)

Division 25 - PHYSICS

AD-287 954 Div. 25
(TISTM/EJH) OTS price $1.00

Franklin Inst., Philadelphia, Pa.
RESEARCH ON SPONTANEOUS MAGNETIZATION IN SOLID BODIES.
Report on Applied Research in Electrical, Electronic and Magnetic Materials,
by A. Neaves. Apr 62, 31p. incl. illus. table, 10 refs.
(Contract AF 33(616)7499, Proj. 7371)
(ASD TDR 62-375) Unclassified report

DESCRIPTORS: *Ferrites, *Ferromagnetic materials, *Ferromagnetism, Single crystals, Paramagnetic resonance, Nuclear magnetic resonance, Nickel compounds, Oxides, Cobalt alloys, Gold alloys, Particles, Mathematical analysis, Resonance absorption.

A series of very fine particle ferrites ranging in size from 18 to 200 Angstroms was subjected to magnetic resonance investigation. These particles show an increasing shift in resonance field with decreasing particle size. The behavior of this shift with decreasing temperature is more complicated. These and other results are discussed on the basis of 2 ferromagnetic resonance equations. The first of these equations removes the restrictions generally imposed in the derivation of the equation of ferromagnetic resonance. This equation should be useful in the description of resonance in macroscopic single crystal ferrites. The second equation takes account of the superparamagnetic nature of the particles and predicts results qualitatively in agreement with those observed. Some work on nickel oxide particles exhibiting weak ferromagnetic and superparamagnetic effects is described. (Author)

AD-288 025 Div. 25
(TISTP/WH) OTS price $2.60

Massachusetts Inst. of Tech., Cambridge.
THE ENVELOPE OF RANDOM VIBRATION OF A LIGHTLY-DAMPED NONLINEAR OSCILLATOR,
by Stephen H. Crandall. Oct 62, 23p. incl. illus. 9 refs. (Rept. no. 201)
(Contract AF 49(638)564)
Unclassified report

DESCRIPTORS: *Oscillation, *Nonlinear systems, *Damping, *Statistical analysis, *Differential equations, *Wave characteristics.

There are several ways in which the envelope of the stationary random response of a lightly-damped oscillator can be characterized. Two characterizations which lead to the same first-order probability distributions for systems with conservative nonlinear restoring forces are described. In such systems the envelope distributions are in general different from the distributions of peak amplitudes. The Duffing system is used to illustrate these general results. For the special case of a Gaussian oscillator an envelope characterization is given by Rice. It is shown that in this case the above envelope characterization has the same first-order distribution as that given by Rice, but that the second-order probability distributions are, in general, different. (Author)

AD-288 040 Div. 25, 12
(TISTA/SEB) OTS price $1.10

Aerospace Corp., Los Angeles, Calif.
SPACE PHYSICS PROGRAM: FLIGHT-TYPE FARADAY CUP DETECTOR.
Semiannual technical note, 1 Jan-30 June 62,
by H. H. Hilton and F. S. Mozer. 31 Aug 62, 2p. (Rept. no. TDR-69(2260-23)TN-1)
(Contract AF 04(695)69)
(DCAS TDR 62-175) Unclassified report

DESCRIPTORS: *Magneto-optical rotation, *Magnetic detectors, Design, Protons, Electrons, Detectors, Research program administration.

A Faraday cup electron and proton detector was constructed, and a preliminary calibration was performed. High voltage supplies and related electronic circuits are being assembled and tested. (Author)

AD-288 043 Div. 25, 30
(TISTP/WH) OTS price $3.60

Northeastern U., Boston, Mass.
A SURVEY OF THE THEORIES UNDERLYING THE MEASUREMENT OF PLASMA PARAMETERS,
by Theodore J. Morin, Jr. and Giovanni Lanza. 5 June 62, 33p. incl. illus. (Scientific rept. no. 1)
(Contracts AF 19(604)8462, AF 49(638)555 and AF 19(604)7358)
(AFCRL 62-502) Unclassified report

DESCRIPTORS: *Plasma physics, *Instrumentation, *Interferometers, *Potentiometers, *Plasma oscillations, Density, Temperature, Microwave probes, Measurement.

Theories supporting various methods of measuring the more important characteristics of a plasma are surveyed. It is not to be implied that all possible methods are covered. Microwave cavity, optical radiation, Stark broadening, and other methods are omitted. Single and double probe, dipole resonance, and visible interferometric measurements are described. It is concluded that as techniques become more refined the direction plasma diagnostics takes will be toward the more passive type optical measurements. (Author)

AD-288 069 Div. 25, 20
(TISTP/JW) OTS price $1.10

Observatorie de Paris-Meudon (France).
(No title).
Final rept.,
by L. Herman. 1962, 5p.
(Grant AF-EOARDC 61-17)
(AFCRL 62-1010) Unclassified report

DESCRIPTORS: *Afterburners, *Nitrogen, Gas ionization, Gases, Mixtures.

The main results are summarized of the investigation of some primary emission processes such as the afterglow of nitrogen due to atomic recombination and the nitrogen-inert gas mixtures afterglow. In relation to the problem of broadening of spectral lines by the statistical ionic field the higher terms of the Stark effect shift for the first hydrogen Balmer lines are calculated. (Author)

AD-288 071 Div. 25
(TISTP/JW) OTS price $3.60

Space Technology Labs., Inc., Los Angeles, Calif.
VARIATIONAL PRINCIPLES FOR ELECTROMAGNETIC POTENTIAL SCATTERING,
by Richard J. Wagner. Sep 62, 35p. 19 refs.
(Rept no. 6120-J568-RU-000)
(Contract AF 04(694)1)
(BSD TDR 62-254) Unclassified report

DESCRIPTORS: *Vector analysis, *Green's function, Scattering, Wave characteristics, Linear systems, Tensor analysis, Electromagnetic effects, Bessel functions, Special function.

Variational methods are considered for the solution of the vector wave equation describing the field due to an arbitrary source placed in the neighborhood of an inhomogeneous absorbing medium. Variational principles for the tensor Green's function were obtained in linear and exponential forms, analogous to the Altshuler principles for the scalar wave function. Stationary forms for the wave function and the scattering amplitude in the standard scattering problem (incident plane wave, outgoing solutions) are recovered when the point source recedes to infinity. For the special case of a spherically symmetric scatterer, the analysis leads to variational principles for the two independent phase shifts. The method is illustrated by a calculation of the fields internal to an axially symmetric potential. (Author)

AD-288 072 Div. 25, 4, 27
(TISTM/RGR) OTS price $3.60

Bendix Systems Div., Bendix Corp., Ann Arbor, Mich.
RADIANCE OF PURE NITROGEN FROM HEATED AIR.
Technical note,
by C. A. Andrade. 31 Aug 62, 32p. incl. illus. tables, 22 refs. (Rept. no. BSC 34395; FS-62TN-1036)
(Contract AF 04(694)26)
Unclassified report

DESCRIPTORS: *Infrared radiation, Molecular spectroscopy, *Nitrogen, Chemical bonds, Rocket propulsion, Gases, Analysis, Re-entry vehicles, Theory, Air, High temperature research, Quantum mechanics, Exhaust gases, Electron transitions, Nuclear physics.

Spectral intensities due to electronic transitions of pure N2 in the first positive group are calculated using a general numerical program for the radiance of equilibrium heated air. Use of the program in optical signature studies of non-ablative re-entry vehicles is discussed. (Author)

AD-288 110 Div. 25
(TISTM/TCG) OTS price $1.10

Catholic U. of America, Washington, D. C.
NOTE ON THE BEHAVIOR OF A VAPOR-LIQUID SYSTEM ABOVE AND BELOW THE CRITICAL POINT,
by Paul H. E. Meijer. 1962, 6p. 6 refs.
(Contract AF 49(638)452)
(AFOSR TN 60-793) Unclassified report

DESCRIPTORS: *Vapors, *Liquids, *Equations of state, Specific heat, Pressure, Mathematical analysis, Thermodynamics.

On the basis of Van der Waals' equation we show that the maxima in the specific heat at constant pressure (infinite below the critical point and finite above) lie on one continuous line through the critical point. Experimental data fit the curve, above as well as below the critical point, although Van der Waals' equation is known to be not entirely correct. The calculation is based on the rules of Ehrenfest for higher order transitions and does not make use of the caloric properties of the substance. (Author)

AD-288 112 Div. 25
(TISTP/WH) OTS price $7.60

California U., Los Angeles.
RESPONSE OF A FLEXIBLY SUPPORTED STRING TO A CONVECTED RANDOM PRESSURE FIELD,
BY P. H. White. Sep 62, 66p. incl. illus. 28 refs. (Rept. no. 62-43)
(Contract Nonr-23362)
Unclassified report

DESCRIPTORS: *Vibration, *Noise, *Structures, *Construction, *Harmonic analysis, *Beams, *Pressure, *Fluid mechanics, Inductance.

The purpose of the work is to investigate the influence of a certain feature always present to some extent in real structures--especially those of aerospace vehicles and submarines--but which has not been accounted for in the theoretical developments, namely, the effect of motion at the boundaries. The case considered is a classical linear string supported by ends having lateral flexibility and excited by a pressure field convected past it. The methods of normal modes and Fourier transforms are used extensively. By such methods the spectral density and mean square response may be readily found. The first part deals with a fixed end string in order to derive the general equations in a convenient form. The second part considers a string having boundary conditions governed by arbitrary impedances. For the arbitrary boundary conditions the eigenvalues of the equation of motion are not integral multiples and the eigenfunctions may not be orthogonal in the general sense. Several methods are derived whereby these non-orthogonal eigenfunctions may be used anyway to derive a set of uncoupled linear differential equations. (Author)

AD-288 125 Div. 25, 30
(TISTP/FR) OTS price $4.60

Naval Ordnance Lab., White Oak, Md.
A MAGNETIC TAPE LIBRARY OF THERMODYNAMIC DATA,
by Bernard A. Burke, Clark P. Lucas, and John P. Toscano. Sep 62, 27p. incl. illus. tables, 18 refs. (Rept. no. NOLTR 62-84)
Unclassified report

DESCRIPTORS: *Thermodynamics, *Data processing systems, Chemicals, Data, Magnetic tape, Data storage systems, Rocket propellants.

The production and use of a magnetic tape library of thermodynamic data is discussed. The tape is produced from a deck of punched cards, six for each of more than one hundred chemical species. The data on each species include an identification number, coded references, formula, and atomic weight (of elemental species), the enthalpy change from 0 to 298.15 K, the standard heat of formation at 298.15 K, melting point and heat of fusion, boiling point and heat of vaporization, coefficients giving the specific heat as a rational function of the temperature, and integration constants permitting calculation of enthalpy and entropy. All data are given for a pressure of one atmosphere. These data permit calculation of enthalpy, entropy and the Gibbs free energy over the temperature range 1000 - 6000 K. The machine program used in the work is presented accompanied by illustrations of its use. Sources of the original data are given. Examples are produced from the literature showing discrepancies for some aluminum and boron compounds. (Author)

AD-288 222 Div. 25
(TISTP/JW) OTS price $5.60

Louvain U. (Belgium).
ELECTRIC POLARIZATION OF CdS SINGLE CRYSTALS AND

PHOTOMAGNETOELECTRIC EFFECTS.
Technical note no. 3, Jan-Sep 62,
by A. Luyckx. 3 Oct 62, 58p. incl. illus.
12 refs.
(Contract AF 61(052)166)
(RADC TDR 62-527) Unclassified report

DESCRIPTORS: *Single crystals, *Polarization, Magnetic effects, Resistance, Ferromagnetism, Cadmium compounds, Sulfur compounds.

The resistivity of single crystals of CdS varies for same conditions of illumination when a magnetic field is imposed. Sometimes this resistivity decreases or increases following the sign of the magnetic field; in other conditions there is increase of resistivity whatever the sign of magnetic field. There are also cases for which magnetic field has no influence on the resistivity. An explanation of these effects is proposed. It is based on the work hypothesis of local electrical polarization of the crystals. Potential measurements were made which confirmed this idea. In some experimental conditions these photovoltages depend on the action of a magnetic field. Quantitative results were obtained for definite conditions which confirm the assumptions. Hysteresis diagrams of photovoltages were plotted. When the infrared radiations which are known to quench photoconductivity are removed, the photomagnetoelectric effects become independent of the sign of the magnetic field and of the current. (Author)

AD-288 232 Div. 25, 15
(TISTB/MS) OTS price $1.60

Ohio State U. Research Foundation, Columbus.
A ONE-ELECTRON POTENTIAL FUNCTION FOR H2,
by Edwin N. Lassettre and James M. Peek.
Sep 62, 11p. incl. tables, 4 refs. (Scientific rept. no. 2)
(Contract AF 19(604)4541, Proj. 7635)
Unclassified report

DESCRIPTORS: *Electrons, *Hydrogen, *Functions, Integral equations, Equations, Energy.

AD-288 237 Div. 25
(TISTP/JW) OTS price $4.60

Microwave Devices Lab., U. of Utah, Salt Lake City.
(No title),
Consolidated Quarterly rept., 1 Apr-30 June 62,
by R. W. Grow, L. S. Bowman and others.
30 June 62, 45p. incl. illus. (Technical rept. no. MDL-Q1)
(Contracts Nonr-128805, AF 04(647)745 and Grant G-15017)
Unclassified report

DESCRIPTORS: *Plasma physics, *Solid state physics, *Electron beams, Microwave spectroscopy, Oscillators, Dielectric properties, Waveguides, Lasers, Generators, Microwaves, Measurement, Density, Discharge tubes, Exhaust gases.

AD-288 240 Div. 25
(TISTP/WH) OTS price $4.60

System Development Corp., Santa Monica, Calif.
THE COMPUTED FREQUENCY AND ANGULAR DISTRIBUTION OF THE NORMAL MODES OF VIBRATION IN RECTANGULAR ROOMS,
by L. W. Sepmeyer. 25 Oct 62, 47p. incl. tables, refs. (Rept. no. SP-1009)
Unclassified report

Presented at the Sixty Fourth Meeting of the Acoustical Society of America, November 10, 1962.

DESCRIPTORS: *Acoustics, *Reflection, *Sound, *Vibration, *Vibration mechanics, *Statistical distributions, Differential equations, Numerical methods and procedures.

The mathematical model used for computing both the frequency and angular distribution of the normal modes in rectangular rooms is described. The criteria adopted were computed for each half-octave band over the first 4 octaves of normalized frequency for rooms with dimension ratios ranging from 3 1/3 to 1, to 1 to 1. Considerle variation in the frequency-spacing criterion exists not only for changes in room dimensions but also from one-half octave band to the next. No clearly defined optimum room dimension emerges from this study. The angular-distribution index is more regularly behaved with rather definite stratification apparent as a function of the room height/length ratio, when the height direction is taken as the angular reference. When both the frequency and angular criteria are combined only a few small regions of dimension ratios appear to be good. From these regions p = .69, q = .43; p = .83, q = .65; p = .82, q = .72 together with p = 1/2 to the one-third power, q = 1/4 to the one-third power appear to be among the best. (Author)

AD-288 245 Div. 25
(TISTP/FR) OTS price $5.60

Defense Research Lab., U. of Texas, Austin.
(No title).
Progress rept. no. 4, 1 July-30 Sep 62.
30 Sep 62, 59p. incl. illus.
(Contract NObs-86165)
Unclassified report

DESCRIPTORS: *Vibration isolators, *Couplings, *Acoustic waveguides, Mounting brackets, Vibration, Separation, Noise, Transmission, Attenuation, Voltage amplifiers, Pipes.

Flexible pipe couplings and vibration-isolating pipe hangers are discussed. Detailed measurements of longitudinal transmissibility of three experimental pipe couplings are compared with calculated values based on measured values of mechanical mobility parameters. Measured output/input characteristics of a logarithmic dc amplifier are given. The amplifier has been considered for use as an element of the proposed impedance/admittance computer. Calculated values of the attenuation constant and wave velocity for lossy acoustic transmission lines are given. Form of the line assumed was a liquid-filled metal pipe with holes in the pipe wall communicating through resistance tubes to a second pipe or chamber containing a highly compressible liquid. Calculations were made for water-filled copper nickel pipe and several different values of the significant parameters governing the shunt resistance and added shunt compliance per unit length. Calculations were made for frequencies in the range 10-2000 cps. (Author)

AD-288 280 Div. 25, 20
(TISTP/JW) OTS price $2.60

Naval Academy, Annapolis, Md.
A LIQUID SCINTILLATION SYSTEM FOR USE WITH A CHERENKOV SYSTEM TO INVESTIGATE INTERACTIONS OF HIGH ENERGY MUONS WITH HEAVY NUCLEI,
by Gary L. Buckwalter. June 61, 23p. incl. illus. 25 refs. (Research rept. no. S-1)
(Contract Nonr-224904, Proj. NR 015-909)
Unclassified report

DESCRIPTORS: *Scintillation counters, *Cerenkov radiation, Mesons, Energy, Electronic equipment, Particles, Cosmic rays.

A large liquid scintillation detector was developed for use in conjunction with a Cherenkov meson telescope to investigate the interaction with small energy transfer of high energy muons with heavy nuclei. The detector is in the form of a cubic plexiglass box and employs decalin activated with alpha-NPO and p-terpheny as the scintillating material. The electronic equipment associated with the detector was assembled and tested. An energy spectrum for local background and cosmic radiation was determined. (Author)

AD-288 288 Div. 25
(TISTP/JW) OTS price $.50

Directorate of Materials and Processes, Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
OBSERVATION OF MAGNETIC DOMAINS BY MEANS OF THE KERR EFFECT.
Final rept., July 61-Mar 62 on Applied Research in Electrical, Electronic and Magnetic Materials, by Axel M. Stoffel and Karl J. Strnat. Sep 62, 13p. incl. illus. 12 refs.
(Proj. 7371)
(ASD TDR 62-683) Unclassified report

DESCRIPTORS: *Magneto-optic rotation, *Ferromagnetic materials, Thin films, Optical analysis, Photoelectric shutters, Magnetic properties, Rotation.

An experimental apparatus was built which employs the magneto-optical Kerr effect for visual observation and photographic recording of magnetic domain patterns. The main objective of this work was to familiarize the investigators with the problems of the Kerr technique and thus provide the basis for designing a more sophisticated apparatus. This report discusses the Kerr effect and its application to the study of magnetic domains and analyzes some of the optical problems incurred in this application. It describes the experimental set-up and presents pictures of domain structures observed on a thin film of Permalloy. (Author)

AD-288 431 Div. 25
(TISTA/GEC) OTS price $8.60

Louvain U. (Belgium).
DYNAMIC BEHAVIOR OF PLATES UNDER THERMAL STRESS, by F. Buckens. Mar 62, 93p. (Technical rept. no. 1)
(Contract AF 61(052)499)
Unclassified report

DESCRIPTORS: *Metal plates, *Sheets, Dynamics, Vibration, Thermodynamics, Thermal expansion, Wave transmission, Mathematical analysis, Frequency, Elasticity, Thermal stresses.

AD-288 504 Div. 25, 9
(TISTP/JW) OTS price $6.60

AVCO Everett Research Lab., Mass.
RATE OF IONIZATION BEHIND SHOCK WAVES IN AIR. II. THEORETICAL INTERPRETATION,
by S. C. Lin and J. D. Teare. Sep 62, 67p. incl. illus. 61 refs. (Research rept. no. 115)
(Contract AF 19(604)7458, Proj. 5561)
(AFCRL 62-751) Unclassified report

DESCRIPTORS: *Ionization, *Shock waves, Velocity, Electron bombardment, Plasma physics, Ions, Temperature, Exchange reactions, Air.

The problem of spontaneous ionization in the reaction zone behind strong normal shock waves in air was treated concurrently with the problem of dissociation and vibrational relaxation. Through a comparison of specific ionization rates, one may conclude that up to a shock velocity of 10 km/sec (about 30 times the speed of sound at room temperature) the predominant electron production process would be atom-atom ionizing collisions. This would be followed in an approximately decreasing order of importance by photoionization, electron impact, atom-molecule collisions and molecule-molecule collisions. The charge exchange reactions, while not contributing directly to the electron production process, were found to have a small but noticeable indirect effect on the resultant electron density distribution at some distance behind the shock due to their continuous shifting of the relative population between atomic and molecular ions which recombine with the electrons at different rates. The specific rate constants for the atom-atom processes required to interpret all existing experimental results appear to be consistent with a simple extrapolation of the low temperature rate constants according to the crossing-point model of Bates and Massey for atom-atom ionizing collisions. (Author)

AD-288 545 Div. 25
(TISTM/BRW) OTS price $3.60

Columbia U., New York.
INFLUENCE OF COUPLE-STRESSES ON STRESS CONCENTRATIONS,
by R. D. Mindlin. Sep 62, 29p. incl. illus. 4 refs. (Technical rept. no. 49)
(Contract Nonr-26609, Proj. NR 064-388)
Unclassified report

DESCRIPTORS: *Applied mechanics, *Stresses, Moments, Theory, Mathematical analysis, Equations, Deformation.

Two-dimensional equations of couple-stress theory for an isotropic, elastic medium are derived. The components of stress and couple-stress are then expressed in terms of the Airy stress function and another stress function which accounts for the couple stresses. After a transformation to polar coordinates, the stress distributions are found for a circular hole in various two-dimensional fields of stress. (Author)

AD-288 549 Div. 25
(TISTB/SAT) OTS price $6.60

Columbia U., New York.
EFFECTS OF COUPLE-STRESSES IN LINEAR ELASTICITY, by R. D. Mindlin and H. F. Tiersten. July 62, 67p. incl. illus. 19 refs. (Technical rept. no. 48)
(Contract Nonr-26609, Proj. NR 064-388; In cooperation with Bell Telephone Labs., Whippany, N. J.)
Unclassified report

DESCRIPTORS: *Stresses, *Elasticity, Green's function, Deformation, Solids, Wave transmission, Mechanical properties, Mathematical analysis.

In a theory of deformation of continua originated by Voigt, the couple per unit area, acting across a surface within a material volume or on its boundary, was taken into account in addition to the usual force per unit area. Some typical effects of such couple-stresses are exhibited by means of solutions of problems of wave-propagation, vibration, stress-concentration and

nuclei of strain--all within the framework of a linearized form of the couple-stress theory for perfectly elastic, centrosymmetric-isotropic materials. (Author)

AD-288 598 Div. 25
(TISTM/TCG) OTS price $1.60

New York U., N. Y.
A STUDY OF THE FAR INFRARED PROPERTIES OF CRYSTALS.
Final scientific rept., 1 Sep 57-31 Aug 62, by J. H. Rohrbaugh. 31 Aug 62, 4p. 4 refs.
(Contract AF 19(604)2673)
(AFCRL 62-746) Unclassified report

DESCRIPTORS: *Crystals, *Sodium compounds, *Chlorides, *Infrared research, Infrared spectrophotometers, Radioactive isotopes, Liquids, Dielectric properties, Magnetrons, Resonance, Frequency, Test equipment, Refractive index, Infrared radiation.

A study was made of a far infrared spectrometer for studying the properties of crystals. The frequency distributions for a diatomic linear chain of Na-23Cl-35.5 were compared with those of a mix crystal of NaCl-35 and NaCl-37. Eigenfrequencies of NaCl at room temperature and 2K were calculated. Tests were made to enhance the harmonic output of the 3J31 magnetron.

AD-288 607 Div. 25
(TISTM/TCG) OTS price $3.60

Goettingen U. (Germany).
''ABSORPTION AND TRANSMISSION OF ELECTROMAGNETIC WAVES'' PHASE M. PART A: COMBINATION OF MAGNETIC LAYER-AND WEDGE TYPE ABSORBERS.
Technical (Annual) rept.,
by R. Pottel and E. Schunk. 30 Sep 62, 35p. incl. illus. 5 refs.
(Contract AF 61(052)154)
(RADC TDR 62-531, vol. 1) Unclassified report

DESCRIPTORS: *Electromagnetic waves, *Transmission, *Absorption, Reflection, Graphite, Paper, Foils, Ferrites, Resistance, Surface properties, Geometry, Plastics, Polymers, Styrenes, Ultra high frequency, Generators, Dielectrics.

An absorption arrangement for electromagnetic waves is being designed incorporating a combination of magnetic layer absorbers and inhomogeneous absorbers. The amplitude reflection coefficient should be below 10% throughout the cm-waves range and also in part of the m-wave range. Matching conditions derived from transmission line theory are evaluated by quadripole measurements. Rib absorbers are used as inhomogeneous absorbers because they are produced with relative ease. The reflection coefficient of such rib absorbers is measured in a coaxial line as function of the frequency for a number of parameters like surface resistivity of the foil, length of the wedge-shaped transition and total length of the sample. The electrical contact between the ribs - consisting of graphite paper - and the adjoining parts of the line was found to be of great significance. Measurements with combinations of ferrite and wedge absorbers have produced a number of useful results. More measurements have to be carried out with other thicknesses of the ferrite layer and with higher surface resistivities of the foil. (Author)

AD-288 635 Div. 25
(TISTP/TL) OTS price $1.10

RAND Corp., Santa Monica, Calif.
A NOTE ON HAMILTON'S EQUATIONS AND INVARIANT IMBEDDING,
by Richard Bellman and Robert Kalaba. Nov 62, 5p. incl. illus. 3 refs. (Memo. no. RM-3380-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Quantum mechanics, *Particles, *Partial differential equations, *Numerical analysis, Time, Oscillations, Perturbation theory, Digital computers, Programming.

A study of computational aspects of the solution of the equations of mathematical physics is presented. A new basic partial differential equation of particle mechanics is derived. (Author)

AD-288 643 Div. 25
(TISTM/TCG) OTS price $1.10

AVCO Everett Research Lab., Mass.
DISSIPATION IN HIGH TEMPERATURE PLASMAS,
by H. E. Petschek. Sep 62, 5p. 2 refs. (Rept. no. 93)
(Contract Nonr-252400)
Unclassified report

DESCRIPTORS: *Plasma oscillations, *Turbulence, *High temperature research, Plasma jets, Plasma physics, Refractive index, Boundary layer, Magnetic fields, Shock waves, Viscosity, Theory.

Under high temperature plasma conditions, both in the laboratory and in interplanetary space, there is considerable experimental evidence for the existence of turbulence. In both cases large scale fluctuations in the magnetic field have been observed. In the laboratory, fluctuations in other measured quantities are also observed. Furthermore, the containment times are much shorter than one would expect, based on diffusion across the magnetic field by particle collisions. Plasma turbulence is discussed in terms of both nonlinear interaction and wave growth. (Author)

AD-288 647 Div. 25
(TISTM/ODN) OTS price $6.60

General Electric Co., Schenectady, N. Y.
RESEARCH ON CdTe.
Quarterly progress rept. no. 6, 1 Aug-31 Oct 62, by M. R. Lorenz, R. E. Halsted and others. 31 Oct 62, 1v. incl. illus. tables, refs.
(Contract AF 33(616)8264)
Unclassified report

This rept includes:
ELECTRICAL PROPERTIES OF N-TYPE CdTe, by B. Segall, M. R. Lorenz, and R. E. Halsted. 1962.

EFFECTIVE ELECTRON MASS IN CdTe, by D. T. F. Marple. 1962.

DESCRIPTORS: *Intermetallic compounds, *Cadmium compounds, *Tellurides, *Semiconductors, *Single crystals, Hall effect, Transport properties, Scattering, Chemical impurities, Theory, Infrared radiation, Reflection, Dielectric properties, Electron mass, Optics, Electrons, Indium, Iodine, Electrical properties.

Transport measurements are reported on high purity and doped n-type single crystal CdTe with 300 K carrier concentrations ranging from 6 x 10 to the 14th power to 2 x 10 to the 18th power per cu cm. Variations of Hall coefficient and resistivity with temperature were investigated. The magnetoresistance and magnetic field dependence of Hall coefficient were also examined. The Hall mobility of high purity CdTe exhibits a region of intrinsic behavior as it rises rapidly

with decreasing temperature. The contributions of acoustic, piezoelectric and non-polar optical mode scattering were negligible. IR Faraday effect and reflectance studies are reported. (Author)

AD-288 650 Div. 25, 7
(TISTP/WH) OTS price $2.25

National Research Corp., Cambridge, Mass.
DEVELOPMENT OF A PHOTOEMISSIVE SOLAR ENERGY CONVERTER.
Final rept., June 61-May 62,
by Peter Fowler, Lewis R. Koller, and Martin P. Schrank. Sep 62, 78p. incl. illus. tables, 27 refs.
(Contract AF 33(616)8415, Proj. 8173)
(ASD TDR 62-600) Unclassified report

DESCRIPTORS: *Photoemission, *Solar energy, *Solar cells, *Electric power production, Work functions, Simulation, Space flight, Ethylenes, Phthalates, Sun, Dielectrics.

The characteristics of a photoemissive solar energy converter were studied. The practical form of this device is a perforated sheet of a dielectric such as polyethylene terephthalate resin coated on one side with a photoemitter and on the other with a low work function conductor. Photoelectrons emitted from the front surface by solar radiation fall back through the holes and are collected on the back surface. The resulting charge transfer builds up a potential difference which may be used to perform useful work. Models were constructed and tested in evacuated glass envelopes of ultraviolet transmitting glass using a xenon arc as a solar simulator. The observed power conversion efficiency was of the order of 1/10,000%. There was no correlation between converter efficiency and geometrical parameters. Measurements of spectral response showed good agreement with published values for Cs_3Sb. Life tests did not show any deleterious effects due to the evaporation which would be expected to occur in space. Calculation of rates of evaporation indicated a life of 0.8 year at 27 C and 70 years at 0 C. The effect of oblique incidence was found by experiment to be a decrease in output at a lower rate with respect to angle of incidence than would be predicted by the cosine law. (Author)

AD-288 652 Div. 25, 20
(TISTP/JW) OTS price $3.60

Naval Academy, Annapolis, Md.
A CERENKOV DETECTION SYSTEM FOR USE WITH A LIQUID SCINTILLATION SYSTEM TO INVESTIGATE INTERACTIONS OF HIGH ENERGY MUONS WITH HEAVY NUCLEI,
by Thomas Donald Tuttle. 1 June 61, 29p. incl. illus. tables, 18 refs. (Research rept. no. S-2)
(Contract Nonr-224904)
Unclassified report

DESCRIPTORS: *Cerenkov radiation, *Scintillation counters, Energy, Electronic equipment, Nuclei, Cylindrical bodies, Mesons, Cosmic rays.

A simple Cerenkov detector for use in selecting high energy muons from sea level cosmic radiation is described. The detector employs two water filled cylinders in a vertical arrangement, and by coincidence techniques provides a fairly well defined beam of high energy (>100 mev) muons with a flux of about 36/hr. It is designed to operate in conjunction with a liquid scintillation system for the investigation of interactions with heavy nuclei. (Author)

AD-288 653 Div. 25
(TISTP/LMH) OTS price $2.60

Goettingen U. (Germany).
ABSORPTION AND TRANSMISSION OF ELECTROMAGNETIC WAVES. PHASE M, PART B: COMBINATION OF MAGNETIC LAYER- AND GRAPHITE FOIL ABSORBERS.
Technical (Annual) rept.,
by H. W. Helberg and N. Roy. 30 Sep 62, 23p. incl. illus. 4 refs.
(Contract AF 61(052)154)
(RADC TDR 62-531, vol. 2) Unclassified report

DESCRIPTORS: *Electromagnetic waves, *Electromagnetic wave reflections, Absorption, Transmission, Reflection, Frequency shift, Frequency analyzers, Measurement, Ferrites, Surfaces, Graphite, Wave transmission.

The electromagnetic properties of a ferrite layer placed in front of a metal plate are investigated. For this purpose the reflection coefficient is measured as a function of the frequency with the thickness of the sample as parameter. The measurements are carried out in a coaxial line with Ferramic E 1960 as test substance. In order to increase the bandwidth at larger thickness of layer the ferrite is electrically shunted with a resistivity foil and the reflection coefficient of this combination is again measured as a function of the frequency. Parameters are the thickness of the ferrite layer and the surface resistivity of the foil. With this combination the operating frequency range is extended towards lower frequencies. Without resistivity foil the reflection coefficient remains about 10% in the entire range. (Author)

AD-288 698 Div. 25, 9
(TISTP/WH) OTS price $7.60

Magnetogasdynamics Lab., Mass. Inst. of Tech., Cambridge.
AN EXPERIMENTAL STUDY OF A HIGH DENSITY PLASMA IN A MAGNETIC PIPE,
by Arthur M. Schneiderman. July 62, 64p. incl. illus. tables (Rept. no. 62-4)
(Contract AF 19(628)221, Proj. 8608)
(AFCRL 62-858) Unclassified report

DESCRIPTORS: *Plasma physics, *Magnetic fields, *Magnetic pinch, *Pipes, *Boundary layer, Fluid flow.

An exploratory study of a device for confinement of a plasma by a periodic magnetic field is undertaken. The periodic confining force is produced by the motion of ionized gas through a magnetic field possessing gradients in the direction of the flow. This geometry has been called a "Magnetic Pipe." Requirements to be met by the magnetic field and the gas properties are developed by order of magnitude considerations. An experimental version of the magnetic pipe is constructed and mounted on the downstream end of a shock tube. Application of the containment requirements to this device indicate that total confinement is not to be expected. However, a reduction in the plasma density near the walls of the pipe is predicted. The heat transfer to fine wires placed in this region is seen to decrease sharply upon the application of the magnetic field. The effects of the moving plasma on the magnetic field is monitored with search coils placed in the flow. These search coil measurements indicate that the magnetic field and the moving plasma are coupling in the manner expected. It is concluded that the predicted density decrease is observed. Modification of the existing equipment and further studies are suggested. (Author)

Division 25 - PHYSICS

AD-288 699 Div. 25
(TISTP/FR) OTS price $4.60

Magnetogasdynamics Lab., Mass. Inst. of Tech., Cambridge.
HEAT TRANSFER PROBE MEASUREMENTS AS A TECHNIQUE TO DEMONSTRATE MHD CONTAINMENT,
by Kenneth A. Rathjen. July 62, 36p. incl. illus. tables, 11 refs. (Rept. no. 62-3)
(Contract AF 19(628)221, Proj. 8608)
(AFCRL 62-857) Unclassified report

DESCRIPTORS: *Gages, *Heat transfer, Gas ionization, Magnetohydrodynamics, Shock tubes, Wire, Coils.

A calorimeter-type gauge was constructed using a pair of twisted number 44 formvar covered copper leads. The twisting minimized the induced voltage to a tolerable level (of the same order of magnitude as the heat transfer signal) provided the gauge was not in the presence of an ionized gas. The induced voltage was increased so much when a plasma was at or near the gauge that no conclusive evidence could be obtained regarding the question of total containment. It was observed that the heat transfer to the gauge was reduced by more than 80% when the magnetic field was applied. This conclusively showed that the plasma was at least partially contained. No conclusion could be drawn as to whether or not the total heat transfer to the gauge (when the magnetic field was applied) was due solely to the driver gas. (Author)

AD-288 702 Div. 25, 4
(TISTM/TCG) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
HEAT AND MASS TRANSFER DURING EVAPORATION OF A LIQUID IN A FORCED GAS FLOW,
by G. T. Sergeyev. 8 June 62, 6p. (Trans. no. FTD-TT-62-327 from Inzhenerno-Fizicheskiy Zhurnal, vol. 4, No. 2, pp. 77-81, 1961)
Unclassified report

DESCRIPTORS: *Liquids, *Heat transfer, *Evaporation, Mass energy relation, Gas flow, Acetones, Benzenes, Water, USSR.

AD-288 703 Div. 25, 4, 22
(TISTM/TCG) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE TRANSFER OF AN EXPLOSION OF GASEOUS OZONE-OXYGEN MIXTURE TO A LIQUID OZONE-OXYGEN SOLUTION,
by B. V. Strakhov, V. P. Lebedev, and N. I. Kobozev. 23 May 62, 3p. (Trans. no. FTD-TT-62-337 from Vestnik Moskovskogo Universiteta, No. 4, pp. 31-32, 1961)
Unclassified report

DESCRIPTORS: *Liquids, *Ozone, *Oxygen, *Explosions, Decomposition, Chemical reactions, Explosive gases, Pressure, USSR, Combustion.

AD-288 722 Div. 25, 10
(TISTM/TCG) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE CALCULATION OF OVER-ALL REACTION RATES AND FLAME VELOCITIES IN GAS MIXTURES,
by O. A. Tsukhanova. 17 May 62, 16p. (Trans. no. FTD-TT-62-270 from Issledovaniye Protsessov Goreniye, Moscow, pp. 81-90, 1958)
Unclassified report

DESCRIPTORS: *Gases, *Mixtures, *Reaction kinetics, *Flame propagation, Combustion, Chemical reactions, Energy, Diffusion, Thermodynamics, USSR.

AD-288 762 Div. 25
(TISTM/ODN) OTS price $1.10

Measurement Systems, Inc., Norwalk, Conn.
QUANTUM DETECTOR FOR MEASUREMENT OF EED BRIDGE WIRE TEMPERATURE RISE.
Monthly progress rept. no. 12, 1-30 June 62. 1 July 62, 1p. (Rept. no. ER-7050)
(Contract N178-7934)
Unclassified report

DESCRIPTORS: *Electric bridges, Temperature, Detectors, Measurement, Wire.

AD-288 773 Div. 25, 4
(TISTM/TCG) OTS price $2.60

Washington U., St. Louis, Mo.
ELECTRON PARAMAGNETIC RESONANCE STUDY OF DIPHENYL NITRIC OXIDE IN SINGLE CRYSTALS,
by Yasuo Deguchi. 26 Jan 61, 17p. illus.
(Contract AF 49(638)464)
(AFOSR-133) Unclassified report

DESCRIPTORS: *Organic compounds, *Free radicals, *Phenyl radicals, *Nitrogen compounds, *Oxides, *Single crystals, Electron diffraction analysis, Paramagnetic resonance, Hyperfine structure.

AD-288 774 Div. 25
(TISTM/TCG) OTS price $4.60

Naval Supersonic Lab., Mass. Inst. of Tech., Cambridge.
SOME EXPERIMENTAL RESULTS AT HIGH TEMPERATURE,
by Eugene E. Covert. Nov 59, 39p. (Technical note no. 350)
Unclassified report

Presented at the meeting of the Hypersonic Facility Committee of the Supersonic Tunnel Association, November 10-11, 1959, at United Aircraft Corp. Research Labs., East Hartford, Conn.

DESCRIPTORS: *High temperature research, *Plasma jets, *Blunt bodies, *Supersonic flow, *Plasma physics, Heat transfer, Mathematical analysis, Vibration, Relaxation time.

AD-288 776 Div. 25
(TISTM/ODN) OTS price $2.60

Battelle Memorial Inst., Columbus, Ohio.
THEORETICAL SOLUTIONS OF GRAIN-BOUNDARY DIFFUSION PROBLEM. APPROXIMATIONS AND INTERPRETATION OF EXPERIMENTS,
by Van E. Wood, Alfred E. Austin and Frederick J. Milford. 1960, 9p. illus. tables.
(AFOSR 3014) Unclassified report

DESCRIPTORS: *Diffusion theory, Equations, Grains (Metallurgy), Solids, Mathematics.

AD-288 791 Div. 25
(TISTW/RD) OTS price $1.10

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
INVESTIGATION OF NON-THERMAL IONIZATION FOR MHD ENERGY CONVERSION.
Quarterly rept. no. 1, 15 Mar-15 June 62,
by George W. Sutton. 28 June 62, 6p.
(Contract AF 33(657)8298, Proj. 3134)
Unclassified report

DESCRIPTORS: *Magnetohydrodynamics, *Gas ionization, Plasma physics, Research reactors, Nuclear power plants.

AD-288 796 Div. 25
(TISTM/ODN) OTS price $1.60

Piezo Crystal Co., Carlisle, Pa.
INDUSTRIAL PREPAREDNESS MEASURE. VERY HIGH FREQUENCY CRYSTAL UNITS CR(XM-18)/U AND HIGH SHOCK AND VIBRATION CRYSTAL UNITS CR(XM-16)/U.
Quarterly rept. for 31 Oct 61-30 Jan 62.
30 Jan 62, 12p.
(Contract DA 36-039-sc-81272)
Unclassified report

DESCRIPTORS: *Crystals, *High frequency, *Quartz crystals, Processing, Manufacturing methods, Production.

AD-288 812 Div. 25, 4
(TISTM/ODN) OTS price $4.60

Naval Ordnance Lab., White Oak, Md.
THE EFFECTS OF ARGON AND HELIUM COLLISIONS ON THE FIRST PRINCIPAL DOUBLET OF SINGLY IONIZED BARIUM.
by Gordon L. Hammond. 3 Aug 62, 36p. incl. illus. 35 refs. (Rept. no. NOLTR 62-122)
Unclassified report

DESCRIPTORS: *Barium, *Argon, *Helium, *Ions, Ionization, Gases, Rare gases, Theory, Microphotometers, Perturbation theory, Resonance, High temperature research, Frequency, Spectrographic cameras, Chlorides, Barium compounds, Vaporization, High pressure research.

The frequency shifts and half-widths of the 2S-2P resonance doublet of Ba II were measured in the range of pressures from 400 to 1100 atm with accompanying temperatures of 3300 to 5000 K. BaCl2 powder was vaporized in Ar or He adiabatically compressed by a gas-driven piston in a closed cylinder, thus generating a hot dense gas containing Ba atoms and ions as additives. With He as the perturbing gas, the 2P1/2 component of Ba II shifted toward the violet, while the 2P3/2 component remained unshifted, and both lines exhibited symmetric intensity profiles. With Ar as the perturbing gas, both lines shifted toward the red, the 2P1/2 component exhibiting a greater shift, and both lines showed marked red asymmetry. Qualitative agreement was observed between the behavior of these Ba II lines and the corresponding lines of neutral alkali atoms perturbed by the same gases, but the form of the interaction law between these excited ions and rare gas atoms could not be determined. (Author)

AD-288 825 Div. 25, 17
(TISTM/BRW) OTS price $6.60

South Dakota School of Mines and Technology, Rapid City.
THE EFFECT OF A MAGNETIC FIELD ON THERMAL AND ELECTRICAL PROPERTIES OF MAGNESIUM STANNIDE AND INDIUM ANTIMONIDE.
Master's thesis,
by Ronald J. Kostelecky. 1 Nov 62, 61p. incl. illus. 33 refs. (Technical rept. no. 7)
(Contract Nonr-296401, Proj. NR 017-208)
Unclassified report

DESCRIPTORS: *Semiconductors, *Intermetallic compounds, *Magnesium alloys, *Indium alloys, Solid state physics, Stannides, Antimonides, Magnetic fields, Thermal conductivity, Temperature, Measurement, Antimony alloys, Tin alloys, Electrical properties, Magnesium compounds, Indium compounds.

The measurements performed allowed the determination of (1) the value and the relative change in a magnetic field of the thermal conductivity of InSb and Mg2Sn, (2) the relative change in a magnetic field of the Seebeck coefficient of InSb and Mg2Sn, and (3) the relative change in a magnetic field of the electrical resistivity of InSb. The relative change measurements on InSb were performed as a function of the magnetic field at four different temperatures. Six different field values were used ranging from about 1000 to 8000 gauss. The relative change measurements on Mg2Sn were carried out only at 8000 gauss. The thermal conductivity of InSb was measured in the temperature range of 308 to 575 K using a series comparison method. The thermal conductivity of an n-type single crystal sample of Mg2Sn was measured at three different temperatures between 374 and 571 K. The thermal conductivity of both Mg2Sn and InSb decreased with an increase in temperature. (Author)

AD-288 827 Div. 25
(TISTB/SAT) OTS price $9.10

Syracuse U. Research Inst., N. Y.
THE SAMPLING OF AEROSOLS IN A TURBULENT AIR FLOW.
Final rept.,
by V. Goldschmidt. 30 Sep 62, 61p. illus. tables, 23 refs.
(Grant no. DA-CML-18-108-61-G-27)
Unclassified report

DESCRIPTORS: *Aerosols, Aerosol generators, Wind tunnels, Atomization, Sprays, Impingers, Cloud chambers, Measurement, Sampling.

The use of a hot wire anemometer to measure local mean aerosol concentration in turbulent flows, as well as stream turbulence, was analyzed. Test results show the reliability of the instrument. Side effects and considerations such as impaction coefficient, coincidence of impaction, sizing of liquid droplets, selection of aerosol generator, thermal forces on the aerosol and methods used for calibration are discussed.

AD-288 885 Div. 25
(TISTM/BRW) OTS price $2.75

Aeroelastic and Structures Research Lab., Mass. Inst. of Tech., Cambridge.
STRESS WAVE PROPAGATION AND SPALLATION IN UNIAXIAL STRAIN.
Final rept., Mar 59-Mar 62 on Nuclear Weapon Effects on Space Vehicles,
by Walter Herrmann, Emmett A. Witmer and others.
Sep 62, 125p. incl. illus. tables, 41 refs.
(Contract AF 33(616)6373 Proj. 6906)
(ASD TDR 62-399) Unclassified report

DESCRIPTORS: *Applied mechanics, *Wave transmission, *Stresses, Propagation, Solids, Dynamics, Equations of state, Aluminium alloys, Copper, Fracture (Mechanics), Metal plates, Impact shock, Theory, Mathematical analysis, Structures.

A discussion of the analytical methods of predicting uniaxial stress wave propagation and spall as a result of uniformly distributed intense impulsive loading is given. For the materials for which data currently exists, no strain-rate effects are observed on yield (i.e. two aluminum alloys) and the strain-rate effect on the fracture threshold is found to be small (copper). For such materials a detailed analytical treatment is possible, once the constants associated with the constitutive equation and

fracture criterion are evaluated. The plate impact experiment provides a convenient means of evaluating these constants. Considerations entering into the interpretation of the plate impact experiment and a detailed analysis of the effect of air between the impacting plates are given. (Author)

AD-288 893 Div. 25
(TISTM/EJH) OTS price $1.60

Westinghouse Electric Corp., Pittsburgh, Pa.
A MATHEMATICAL ANALYSIS OF SOLUTE REDISTRIBUTION DURING EVAPORATION WITH A CARRIER GAS,
by W. A. Tiller. 23 July 62, 12p. incl. illus. 6 refs. (Scientific paper no. 62-944-116-P1)
(Contract AF 49(638)1029)
Unclassified report

DESCRIPTORS: *Vapor plating, *Single crystals, *Kinetic theory, Solutions, Evaporation, Liquids, Gases, Transport properties, Gas flow, Vapors, Diffusion, Differential equations, Mathematical analysis.

Control of solute flux entering a carrier gas stream requires a knowledge of the solute distribution in the liquid during the evaporation and the gas-phase boundary layer characteristics at the surface of the liquid. A mathematical analysis is presented of the solute redistribution in a one-dimensional liquid system as a function of position and time during evaporation at a constant rate. Evaporation kinetics are assumed to be sufficiently rapid for equilibrium to prevail at the surface of the liquid and the evaporation flux is assumed to be transport controlled. It is further assumed that the flow of carrier gas is sufficient to produce a solute boundary layer of thickness 2L at the surface. The solute concentration outside this boundary layer is that of the in-coming carrier gas. Cases of (1) purely diffusional transport in the liquid (no mixing) and (2) primarily convective transport in the liquid (partial mixing) are considered. (Author)

AD-288 906 Div. 25, 8
(TISTP/JW) OTS price $1.10

Rauland Corp., Chicago, Ill.
EXPERIMENTAL CATHODE RAY TUBES WITH FIBER OPTIC INSERTS IN FACEPLATE.
Quarterly engineering rept. no. 2, 27 July-27 Oct 62.
12 Nov 62, 4p.
(Contract NObsr-87395)
Unclassified report

DESCRIPTORS: *Cathode ray tubes, *Optical systems, Cathode ray tube screens, Phosphors, Electrical properties, Electron guns, Surfaces, Processing, Seals.

This report relates to the construction of two cathode-ray tubes having fiber optic inserts. These tubes should be similar to cathode-ray tube Type 10KP7-A, except that P-25 phosphor is used instead of P-7 and there shall be a fiber optic insert 3'' x 3'' located near the outer edge of the useful screen area. This contract has two basic problems compared to conventional tubes of the same type: (1) The production of the fiber components; (2) The sealing in of the rather large fiber section in a manner which is leak tight and sufficiently free from strains to permit normal exhaust procedures (exhaust and simultaneous baking). (Author)

AD-288 907 Div. 25
(TISTP/WH) OTS price $1.60

RAND Corp., Santa Monica, Calif.
DYNAMIC PROPERTIES OF MATTER UNDER HIGH STRESS-THERMODYNAMIC DESCRIPTIONS,
by H. L. Brode and A. C. Smith. Nov 62, 9p. incl. illus. 4 refs. (Memo. no. RM-3361-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Solids, *Compressible flow, *Thermodynamics, *High temperature research, *Stresses, *Rock, Pressure.

Although solids behave elastically at very low stress levels, and exhibit complex visco-elastic and plastic behavior at higher stress levels, when stresses in the megabar range are applied, it is generally more meaningful to ignore stress tensor descriptions and turn to thermodynamic and fluid dynamic descriptions. At high enough stress levels the response of any material must be viewed as characteristic of a compressible fluid. Some empirical information is available in the regions of stress of a few kilobars to a few megabars from high explosive shock experiments. Static compression data are useful guides at lower stresses, while at the highest levels one finds the properties are reasonably well determined by atomic models such as a Fermi-Thomas-Dirac temperature-dependent model. Theoretical calculations, numerical in nature, have provided the thermodynamic properties of all atomic elements. The properties of chemical mixtures as occur in natural materials can be constructed from suitable combinations of these elementary results. Successful use has been made of such results for calculations of dynamic response under high impulse loadings in a variety of applications. One particular example (for basalt) is illustrated. (Author)

AD-288 927 Div. 25, 8
(TISTP/JW) OTS price $4.60

Aerospace Corp., El Segundo, Calif.
A SIMPLIFIED THEORY OF MAGNETOHYDRODYNAMIC ISOTROPIC TURBULENCE,
by R. Betchov. 11 Oct 62, 40p. incl. illus. 11 refs. (Rept. no. TDR-169(3230-14)TR-1)
(Contract AF 04(695)169)
(SSD-TDR 62-121) Unclassified report

DESCRIPTORS: *Magnetohydrodynamics, *Turbulent flow, Motion, Energy, Differential equations, Kinetic theory, Deterioration, Vortices, Magnetic effects, Convection.

The simplest case of turbulent motion in a conductive fluid is studied. The turbulence is assumed incompressible, isotropic, homogeneous, charge invariant and free of fourth-order cumulants. The emphasis is placed on certain integrals of the correlation functions such as kinetic and magnetic energy, vorticity, and current. A system of nonlinear ordinary differential equations is derived which governs these integral quantities. Several cases are solved numerically, illustrating the decay of ordinary turbulence, the buildup of magnetic energy by a linear or a nonlinear process, the buildup of kinetic energy, as well as the destruction of vorticity by Lorentz forces. In order to handle certain dissipative effects, a special hypothesis is introduced which seems to promote mathematical simplicity. In particular, it leads to a simple decay law very similar to the decay law of ordinary turbulence. (Author)

AD-288 928 Div. 25, 8
(TISTP/JW) OTS price $2.60

Aerospace Corp., El Segundo, Calif.
A SURVEY OF DIAGNOSTIC METHODS FOR IONIZED GASES

USING MAGNETIC FIELDS,
by R. Betchov and A. E. Fuhs. 21 Sep 62, 23p. incl. illus. 7 refs. (Rept. no. TDR-169(3153) TR-1)
(Contract AF 04(695)169)
(BSD TDR 62-237) Unclassified report

DESCRIPTORS: *Ionization, *Magnetic fields, Inductance, Instrumentation, Measurement, Electrical properties, Conductivity, Velocity, Gases.

A number of instruments designed to probe the plasma sheet during re-entry or any other plasma flow are described. The instruments produce magnetic fields and respond to the currents induced in the plasma as it cuts through the magnetic field. The set of instruments can measure: an averaged value of the product of conductivity times velocity, a profile of the same product, the local flow direction, an averaged flow velocity, and certain turbulent fluctuations. Another instrument, now being developed, will measure an average value of the electron-neutral collision frequency. Flight instruments and laboratory instruments are briefly described. Calibration procedures are outlined. (Author)

AD-288 941 Div. 25, 8
(TISTP/JW) OTS price $2.60

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
MAGNETOHYDRODYNAMICS AND ENERGY CONVERSION.
Technical status rept. no. 8 for period ending 31 Aug 62.
15 Sep 62, 20p. incl. illus. 8 refs.
(Contract AF 33(616)7624)
Unclassified report

This report was included as a section of Quarterly Progress Report no. 67, October 15, 1962, of the Research Laboratory of Electronics.

DESCRIPTORS: *Magnetohydrodynamics, *Plasma physics, Electric fields, Electromagnetic fields, Special functions, Fluid flow, Paramagnetic resonance.

AD-288 971 Div. 25, 8
(TISTP/JW) OTS price $1.10

Aerospace Information Div., Washington, D. C.
FERROMAGNETIC THIN-FILM STUDIES.
23 May 62, 5p. (AID rept. no. 62-70; Trans. from Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya, vol. 26, no. 2, pp. 296-317, Feb 62)
Unclassified report

DESCRIPTORS: *Ferromagnetic materials, *Thin films, Iron, Magnetic properties, Nickel.

AD-288 975 Div. 25
(TISTP/JW) OTS price $1.10

Aerospace Information Div., Washington, D. C.
ANNOUNCEMENT OF A SOVIET LASER.
18 June 62, 2p. (AID rept. no. 62-82; Trans. from Chernyshev, V. Light beams serve humanity. Sovetskiy patriot, 3p. 6 June 62)
Unclassified report

DESCRIPTORS: *Lasers, USSR.

AD-288 976 Div. 25
(TISTP/JW) OTS price $1.10

Aerospace Information Div., Washington, D. C.
DISTRIBUTION OF ENERGY IN AN UNDERWATER SPARK DISCHARGE.
29 June 62, 4p. (AID rept. no. 62-89; Trans. from Vorotnikova, M. I. Effect of the heat-emission rate in an underwater electric explosion on the distribution of the explosion energy. Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 2, pp. 110-112, 1962)
Unclassified report

DESCRIPTORS: *Energy, *Spark ignition, Underwater.

AD-288 980 Div. 25
(TISTP/JW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A DEVICE FOR MEASURING GRAVITATIONAL FORCE,
by V. V. Kochegura. 19 July 62, 3p. (Trans. no. FTD-TT-62-762 from Soviet Patent No. 133616 (659400/26), 19 Mar 60)
Unclassified report

DESCRIPTORS: *Gravity, *Measurement, Instrumentation, Gravimetric analysis.

AD-288 983 Div. 25
(TISTP/JW) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A STUDY OF THE LAWS OF MOTION OF AN ATOMIZED STREAM OF LIQUID,
by A. S. Lyshevskiy. 1 Mar 62, 13p. (Trans. no. FTD-TT-414 from Izvestiya Vysshikh Uchebnykh Zavedeniy, Energetika, No. 6, pp. 136-144, 1960)
Unclassified report

DESCRIPTORS: *Motion, *Fluid flow, Liquids, Translations, Radiation effects.

AD-288 984 Div. 25, 8
(TISTP/JW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE COLLISION INTEGRAL OF CHARGED PARTICLES IN A MAGNETIC FIELD,
by V. M. Yeleonskiy, P. S. Zyryanov and V. P. Silin. 11 May 62, 4p. (Trans. no. FTD-TT-62-378 from Fizika metallov i metallovedeniye, vol. 11, No. 6, pp. 955-957, 1961)
Unclassified report

DESCRIPTORS: *Magnetic fields, *Particles, *Integrals.

AD-288 985 Div. 25
(TISTP/JW) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
HEAT TRANSFER AND HYDRAULIC RESISTANCE DURING HELICAL FLOW OF A FLUID IN A TUBE,
by M. Kh. Ibragimov, Ye. V. Nomofilov, and V. I. Subbotin. 9 May 62, 9p. (Trans. no. FTD-TT-62-315 from Teploenergetika, No. 7, pp. 57-60, 1961)
Unclassified report

DESCRIPTORS: *Heat transfer, *Fluid flow, Hydraulic systems, Translations, Resistance.

AD-288 987 Div. 25
(TISTP/JW) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
COMPENSATION OF ION SPACE CHARGE BY ELECTRONS,
by V. P. Ignatenko and A. S. Myasnikov.
9 May 62, 14p. (Trans. no. FTD-TT-62-317 from Radiotekhnika i Elektronika, vol. 6, No. 12, pp. 2084-2092, 1961)
Unclassified report

DESCRIPTORS: *Plasma physics, *Ionization, Electrons, Space charges.

AD-288 991 Div. 25, 9
(TISTP/WH) OTS price $1.10

Institute of Aerophysics, U. of Toronto (Canada).
INVESTIGATIONS OF AERODYNAMICALLY GENERATED SOUND.
Final technical rept.,
by H. S. Ribner. Jan 62, 6p. (UTIA rept. no. 81)
(Contract AF 49(638)249)
(AFOSR 2148) Unclassified report

DESCRIPTORS: *Sound, *Noise, *Aerodynamics, *Jet plane noise.

AD-289 008 Div. 25
(TISTM/TCG) OTS price $5.60

Raytheon Co., Waltham, Mass.
FAILURE MECHANISMS IN FERROELECTRIC AND NONLINEAR DIELECTRICS,
by G. Ruppercht, W. Winter, and J. S. Waugh.
July 62, 48p. incl. illus. 10 refs. (Technical note no. 1; Rept. no. S-452)
(Contract AF 30(602)2678)
(RADC TDR 62-404) Unclassified report

DESCRIPTORS: *Dielectrics, *Ferroelectric materials, *Single crystals, *Strontium compounds, *Titanates, Electrical conductance, Dielectric properties, Elasticity, Piezoelectric effect, Microwave spectroscopy, Chemical impurities, Iron, Microwave spectroscopy, Crystals, Growth, Preparation, Failure (Mechanics), Electrical properties.

The electrical conductivity of SrTiO3 was measured by dc and microwave techniques. Pure, doped, and oxygen deficient material was studied and the temperature dependence of the conductivity was observed. Activation energies in the pure materials and mobilities in the oxygen deficient materials were measured. Preliminary studies of the breakdown voltages in pure SrTiO3 showed bulk breakdown strengths of 10 to the 6th power v/cm. The temperature dependence of the electrostrictive constant g sub 31 was studied in the paraelectric temperature range for pure single crystal SrTiO3. Annealing procedures were developed for the strain-relief of flame fusion grown SrTiO3 boules. (Author)

AD-289 009 Div. 25, 20, 30
(TISTE/CRJ) OTS price $1.60

RCA Victor Co., Ltd. (Canada).
SOLID STATE CHARGED PARTICLE SILICON DETECTORS.
Final technical rept., 1 June 61-31 May 62 on Research in General Physics,
by J. W. Hallam and R. L. Williams. Aug 62, 15p. incl. illus. 3 refs.
(Contract AF 33(616)8373, Proj. 7112)
(ARL 62-406) Unclassified report

DESCRIPTORS: *Radiation counters, *Electron counters, *Alpha counters, *Solid state physics, *Silicon, *Proton counters, *Gamma counters, *Beta counters, Semiconductors, Lithium, Encapsulation, Diodes, Ionization, Radiation instruments.

Research concerns the Li ion drift method of making wide depletion layer solid state nuclear particle detectors. Li ions, drifting in the field of a reverse biased Si diode at temperatures in the 100 to 140 C range, compensate to a high degree the original impurities of a pellet. With a suitably drifted unit, a voltage of 100 v or less will extend the depletion layer completely across a compensated region a few mm deep. Li atoms were diffused through a surface which had been diffused previously with P. The P diffusion provides a high conductivity surface layer necessary for the formation of good electrical diodes. As a high surface concentration of Li atoms is not required, only sufficient quantities need be diffused into the Si pellet as are required for compensation of original impurities. Al alloy layers were used for contacting to the back of the wafer. This contact was found not to give rise to excessive currents when the depletion layer is extended to the back of the pellet. If Li ions are accumulated in this alloy layer the diode current rises excessively. The excess of Li ions can be removed by changing the polarity of the drifting current which drifts the excess back into the pellet. Spectra taken using Cs-137 beta and gamma rays are presented along with a Po spectrum. (Author)

AD-289 012 Div. 25, 8
(TISTP/JW) OTS price $2.60

Space Technology Labs., Inc., Redondo Beach, Calif.
THE ELECTRICAL CONDUCTIVITY OF WEAKLY IONIZED GASES,
by Paul Molmud. Oct 62, 25p. incl. tables, 19 refs. (Rept. no. 6120-J757-RU-000)
(Contract AF 04(694)1)
(BSD TDR 62-324) Unclassified report

DESCRIPTORS: *Ionization, *Electromagnetic waves, Conductivity, Absorption, Pressure, Plasma physics, Partial differential equations, Electrical properties, Gases.

Some elementary solutions of the wave equation are obtained for electromagnetic waves in an ionized gas. The solutions demonstrate the importance of conductivity in controlling absorption. Improper computation of conductivity by conventional theory may lead to order of magnitude errors in estimating absorption. The theory of A.C. conductivity for a weakly ionized gas is reviewed. It is shown when and how the exact theory may be employed in conventional form and without error. The expression for the conductivity of a weakly ionized mixture of gases is formulated and analyzed in the low, intermediate and high pressure regions. The conductivity of the mixture is shown to be reducible to the sum of conductivities of gases of constant cross section but complex wave frequencies. Appropriate tables for the evaluation of these latter conductivities are being constructed. (Author)

AD-289 015 Div. 25, 14, 26
(TISTM/EJH) OTS price $1.60

Stanford Research Inst., Menlo Park, Calif.
BETA-SILICON CARBIDE AND ITS POTENTIAL FOR

DEVICES.
Quarterly technical rept. no. 3, 1 Aug-31 Oct 62, by W. E. Nelson. 15 Nov 62, 10p. incl. table, 32 refs. (Rept. no. 9)
(Contract NObsr-87235)
Unclassified report

DESCRIPTORS: *Silicon compounds, *Carbides, *Single crystals, Manufacturing methods, Crucibles, Graphite, Nitrogen, Impurities, Controlled atmospheres, Resistance, Semiconductors, Growth.

The resistivities of crystals of beta-SiC grown during this quarter increased nearly another order of magnitude over those obtained during the last report period. This increase, from approximately .5 to 3.8 ohm-cm, accompanied progress in minimizing the sources of N contamination during crystal growth. Routine degassing of graphite crucibles at 2150 C and 10 to the -5th power mm Hg within the crystal grower was achieved. Analyses of Si stock used for crystal growth revealed N contents as high as 43 ppm. Specially purified low-N-content Si rod was obtained, and a vacuum extraction procedure for removing any remaining dissolved N was developed. Analyses of ordinary standard tank He used for the crystal growing furnace atmosphere revealed N contamination as high as 600 ppm. Analyzed premium grade He containing less that 10 ppm N was received from suppliers and a new bakeable purification train is being constructed to assure a N-free furnace atmosphere. (Author)

AD-289 025 Div. 25
(TISTP/WH) OTS price $1.60

International Astronautical Congress, Berne (Switzerland).
ON THE MOTION OF A BODY OF VARIABLE MASS WITH CONSTANT AND DECREASING POWER CONSUMPTION IN A GRAVITATIONAL FIELD, PART II,
by G. L. Grodzovsky, Y. N. Ivanov and V. V. Tokarev. 1962, 9p. illus. 5 refs.
Unclassified report

Presented at the 13th International Astronautical Congress at Varna, Bulgaria, 23-29 Sep 1962.

DESCRIPTORS: *Guided missiles (Strategic), *Motion, *Gravity, *Rocket fuels, *Ballistics, *Guided missile trajectories.

AD-289 056 Div. 25, 17
(TISTM/ODN) OTS price $1.10

Cornell U., Ithaca, N. Y.
EFFECT OF CRYSTALLINE IMPERFECTIONS UPON THE ELECTRICAL PROPERTIES OF SEMICONDUCTING INTERMETALLIC COMPOUNDS.
Final rept.,
by C. W. Spencer. 15 Oct 62, 4p. incl. table.
(Contract AF 49(638)480)
Unclassified report

DESCRIPTORS: *Semiconductors, *Intermetallic compounds, *Alloys, Tellurides, Selenides, Bismuth alloys, Antimony alloys, High temperature research, Hydrostatic pressure, Abstracting, Metallic crystals, Gases, Thermochemistry, Thermodynamics, Stability, Dissociation, Hall effect, Electrical properties.

Two new experimental techniques were developed which made it possible to measure electrical properties at elevated temperatures or under high hydrostatic pressures. A device which enables the measurement of conductivity of Hall constant at temperatures above 600 C was successfully developed. Pressure vessels were constructed to measure resistivity under hydrostatic pressures up to 30,000 atoms and temperatures above 100 C. The properties of Bi_2Te_3 were studied as a function of pressure and alloy composition. For the alloy study, systems of Bi_2Te_3-Sb_2Te_3 and Bi_2Te_3-Bi_2Se_3 were chosen so that systematic substitution at different layers of the Bi_2Te_3 structure was obtained. The properties observed show strong correlation with the anisotropic layer structure of this system. (Author)

AD-289 254 Div. 25, 9
(TISTP/JW) OTS price $5.60

California U., Berkeley.
WAVE PROPAGATION IN A MOVING PLASMA,
by Edmund Pinney. Aug 62, 59p. incl. illus. table, 5 refs.
(Contract Nonr-22295)
Unclassified report

DESCRIPTORS: *Plasma physics, *Wave characteristics, Particles, Motion, Ionosphere, Fluid flow, Velocity, Propagation.

The effect of particle motion or plasma 'wind' on waves propagated through the plasma is investigated. The solar wind is a plasma wind, and there appear to be high velocity winds in the ionosphere which may affect wave propagation in or through the ionosphere. The problem also arises in connection with the effect of massive moving plasmas on radio signals. To understand this situation, plane waves propagating in a uniformly flowing plasma are investigated. In this study, plane waves will be superimposed on a 'homogeneously flowing' plasma in which all the particles in the flow are executing motions similar to those of the single particles in first order orbit theory. Uniform flow is the special case of homogeneous flow in which electric balance exists so that all particles move with the same velocity. (Author)

AD-289 263 Div. 25
(TISTM/BRW) OTS price $11.00

Carnegie Inst. of Tech., Pittsburgh, Pa.
THEORY AND APPLICATIONS OF PIEZORESISTANCE OF DIFFUSED LAYERS IN SILICON AND GERMANIUM,
by Donald R. Kerr. Oct 62, 136p. incl. illus. tables, 44 refs.
(Contract Nonr-76009)
Unclassified report

DESCRIPTORS: *Semiconductors, *Germanium, *Silicon, Diffusion, Boron, Arsenic, Stresses, Deformation, Elasticity, Electrical properties, Transducers, Strain gages, Theses, Piezoelectric effect.

This thesis describes the piezoresistive properties of diffused layers in Si and Ge. The piezoresistive effect in uniformly-doped semiconductors with the diamond or zincblende structure is first reviewed, and published measurements on Si and Ge are given. An analysis relating electric field and sheet current components in a diffused layer under elastic strain shows that the layer is characterized by diffused piezoresistive coefficients which are functions of the orientation, the surface impurity concentration, and the type of diffused impurity profile, but are independent of the p-n junction depth. The room temperature coefficient of primary importance in strain gages is numerically calculated for Gaussian and com-

plementary-error-function profiles in p-type diffused Si and n-type diffused Ge with surface concentrations ranging from 10 to the 17th power to 5 times 10 to the 19th power atoms per cc.

(Author)

AD-289 264 Div. 25
(TISTP/JW) OTS price $4.60

Institute of Engineering Research, U. of Calif. Berkeley.
ON THE METHOD OF GREEN'S FUNCTION IN THE THERMOELASTIC THEORY OF SHALLOW SHELLS,
by R. P. Nordgren. Aug 62, 40p. incl. illus. 23 refs. (Technical rept. no. 16; Series no. 131, Issue no. 16)
(Contract Nonr-22269, Proj. NR 064-436)
Unclassified report

DESCRIPTORS: *Green's function, *Thermal conductivity, Elastic shells, Stresses, Temperature, Thermal expansion, Shear stresses.

The method of Green's function is applied to the quasi-static thermoelastic theory of shallow shells with heat conduction equations included. Solution formulas are derived for middle-surface displacements and stress and temperature resultants in terms of initial and edge temperatures, internal heat sources, ambient temperatures at the upper and lower surfaces, and surface tractions. Equations are given for the Green's functions appearing in the solution formulas. Extension to more general shell theory is discussed. By way of example, the method is applied to thermoelastic problems for two classes of shallow shells. Also, the effect of transverse shear deformation is examined with reference to a shallow spherical shell. (Author)

AD-289 266 Div. 25
(TISTP/TL) OTS price $2.60

Institute of Flight Structures, Columbia U., New York.
PURE BENDING OF BEAMS OF VARIABLE RECTANGULAR SECTION,
by Bruno A. Boley. Aug 62, 20p. incl. illus. table, 8 refs. (Technical rept. no. 22; CU-22-62-ONR266(20)-CE)
(Contract Nonr-26620)
Unclassified report

DESCRIPTORS: *Beams, *Stresses, Shear stresses, Deformation, Deflection, Series, Materials, Moments, Functions, Partial differential equations.

A method is presented for the calculation of stresses and deflections of thin rectangular beams of arbitrary variable depth according to the theory of plane stress. The solution is obtained in the form of a series, the first term of which is identical with the strength-of-materials solution and the others represent the necessary correction to that theory. This correction is found to be small for thin beams and when certain conditions are satisfied by the ordinates (and their span-wise derivatives) of the upper and lower edges of the beam. The proper choice of the 'axis' of non-uniform beam is discussed. (Author)

AD-289 275 Div. 25, 8
(TISTP/WH) OTS price $1.10

New York U., N. Y.
(No title).
Final rept.,
by Benjamin Bederson. 21 Nov 62, 3p.
(Contract AF 49(638)943)
Unclassified report

DESCRIPTORS: *Cavity resonators, *Atoms, *Dissociation, *Microwaves, *Gas discharges, *Recombination reactions, *Molecular association.

The development of microwave diagnostic techniques for measuring the concentration of hydrogen atoms in a discharge and the application of these methods to the study of the rate constants associated with volume and surface recombination is investigated. A microwave cavity spectrometer has been built, especially designed to detect the 1420 Mc/sec. transition in atomic hydrogen corresponding essentially to the zero field hyperfine separation of the ground state. It has been designed so that line shape measurements may be obtained in both the absorption and dispersion modes. One can then relate these measurements to the concentration of atomic hydrogen within a test volume positioned in the cavity, thereby providing a means of measuring recombination rate constants. (Author)

AD-289 280 Div. 25
(TISTP/TL) OTS price $3.60

Plasmadyne Corp., Santa Ana, Calif.
EXPERIMENTAL AND THEORETICAL STUDIES OF MHD SHEAR HEATING.
Final technical documentary rept.
Sep 62, 30p. incl. illus. table, 5 refs. (Rept. no. FR-092-3518(00))
(Contract Nonr-351800)
Unclassified report

DESCRIPTORS: *Magnetohydrodynamics, *Heating, *Plasma physics, Magnetic fields, Electric discharges, Microwaves, Reflectometers, Photography, Motion, Oscillograms, Argon.

Magnetohydrodynamic (MHD) shear heating, which occurs at the interface of two counter-rotating layers of plasma, is evaluated as a means for rapidly heating a confined plasma. An experimental program to examine the feasibility of such a scheme was undertaken. The two interacting plasmas are initially set into rotational motion via the application of J x B Lorentz forces. Insofar as their longitudinal collisional velocities are concerned, these are produced in the coaxial plasma guns which are described. This technique (rotational shear) for heating a plasma has three important features: (1) although the Joule heating decreases as the plasma temperature rises because of a decrease in resistivity, the viscosity increases with temperature; (2) energy transfer to the plasmas becomes more efficient as their rotation increases; and (3) the magnetic field providing the rotational effect also serves to confine the plasma via a mirror machine configuration. (Author)

AD-289 298 Div. 25, 4, 1
(TISTM/ODN) OTS price $8.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
THE ABLATION OF GRAPHITE IN DISSOCIATED AIR. PART I. THEORY,
by Sinclaire M. Scala. Sep 62, 1v. incl. illus. tables, refs. (Rept. no. R62SD72)
Unclassified report

Presented at the IAS National Summer Meeting, 19-22 June 1962, Los Angeles, California.

DESCRIPTORS: *Air, *Graphite, *Ablation, Hypersonic test vehicles, Theory, Combustion, Boundary layer, Dissociation, Wings, Leading edge flaps, Oxidation, Differential equations, Heat transfer, Transport properties, Diffusion theory, Gases, Integral equations, Chemical equilibrium, Thermodynamics, Viscosity.

An analysis is presented of the combustion of graphite in a high speed stream of dissociated air. The reaction rate controlled-and transition-regimes are considered at length, and it is shown how the grade of graphite and its specific chemical properties influence the over-all oxidation rate. It is shown how the governing equations of change may be reduced to a coupled set of non-linear differential equations of the 15th order with variable coefficients and split boundary conditions. These differential equations are utilized in treating the laminar, compressible, multicomponent, chemically reacting boundary layer in the diffusion controlled regime, and solutions are obtained for both the equilibrium and frozen gas flow chemical constraints. Correlated results are obtained for the heat transfer and mass transfer rates, and the skin friction coefficient for the complete range of suborbital hypersonic flight conditions of interest. Many details of the structure of the boundary layer, including the variation of macroscopic gas velocity, gas temperature, chemical composition and chemical source terms through the boundary layer, are presented. (Author)

AD-289 323 Div. 25
(TISTP/WH) OTS price $2.60

Naval Research Lab., Washington, D. C.
STUDY OF A SHEATH INSTABILITY IN A HIGH-DENSITY RF INDUCTION PLASMA.
Final rept.,
by W. J. Graham. 26 Oct 62, 26p. incl. illus. table, 17 refs. (NRL rept. no. 5841)
Unclassified report

DESCRIPTORS: *Rare gases, *Plasma physics, *Magnetic fields, *Argon, *Sparks, *Electric arcs, Induction systems, Gas ionization, Molecules.

Experimental results show that a steady-state rf induction discharge in some rare gases may, with sufficient power, develop a segmented appearance, and the application of an external dc fringe magnetic field may cause the bipolar boundary sheath to become unstable and erupt a luminous jet. This jet projects into the plasma interior and forms a ''spark streak'' which may remain imbedded in the plasma for hours. The spark-streak radiation is characteristically a continuum in the visible spectrum. An extensive experimental study has determined the prerequisite conditions of gas type, purity, pressure, power, etc., for this phenomenon. The observed continuum is attributed to the presence of molecular ions, this hypothesis being supported by the experimental evidence that the phenomenon does not occur in Penning mixtures. A possible mechanism considered is the dissociative recombination of the molecular ions. (Author)

AD-289 341 Div. 25
(TISTP/WH) OTS price $4.60

Aerospace Corp., Los Angeles, Calif.
THE VIBRATIONS OF A WHIRLING RAYLEIGH BEAM,
by John P. Jones and Pravin G. Bhuta. 7 Sep 62, 33p. incl. illus. 9 refs. (Rept. no. TDR-69(2230-09)TN-6)
(Contract AF 04(695)69)
(DCAS TDR 62-117)
Unclassified report

DESCRIPTORS: *Rotating structures, *Vibration, *Beams, *Dynamics, Differential equations, Deformation.

The vibrations of a whirling Rayleigh beam are studied. The vibrations are allowed to take place in the plane of rotation as well as in a direction perpendicular to the plane of rotation. Use was made of undeformed coordinates resulting in the prediction of certain instabilities that have been previously reported. The solutions of the frequency equations for a fixed-free beam and a simply supported beam are discussed. (Author)

AD-289 345 Div. 25
(TISTP/WH) OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
ELECTRONICS PROGRAM. NONLINEAR OPTICAL EFFECTS.
Semiannual technical rept., 1 Jan-30 June 62,
by T. S. Hartwick. 9 Oct 62, 6p. incl. illus. 6 refs. (Rept. no. TDR-69(2250-23)TR-1)
(Contract AF 04(695)69)
(DCAS TDR 62-198) Unclassified report

DESCRIPTORS: *Lasers, *Wave characteristics, *Optics, *Microwaves, *Oscillation, Nonlinear systems, Quartz, Ruby, Extremely high frequency.

The generation of subharmonics (parametric oscillations) by an intense laser beam was studied theoretically and experimentally. Experiments were conducted to detect subfrequencies in both quartz and ruby materials. A new frequency doubling scheme is being analyzed; and various experimental apparatus, including a giant pulse apparatus, are being constructed. (Author)

AD-289 359 Div. 25, 8
(TISTP/WH) OTS price $8.60

Republic Aviation Corp., Mineola, N. Y.
RADIATIONS FROM AN EXPANDING PLASMA IN AN EXTERNAL MAGNETIC FIELD, VOLUME II.
Technical rept., 20 Jan 61,
by H. Rosner. 20 Jan 61, 92p. incl. illus. tables, 9 refs.
(Contract AF 29(601)2324, Proj. no. 4988)
(AFSWC TR 61-1, vol. II)
Unclassified report

DESCRIPTORS: *Plasma physics, *Magnetic fields, *Electromagnetic waves, *Gas ionization, *Electrons, Cyclotrons, Explosions.

Three types of radiation from an expanding plasma in a magnetic field are investigated, namely, dipole radiation due to surface currents, the surface cyclotron and synchrotron radiations, and volume synchrotron radiation. In each case, the total radiation loss rates are derived, as well as other radiation characteristics such as directional intensities and spectral structure. In the calculation of surface and volume radiation, the nonrelativistic phenomena are based on a Maxwellian electron distribution, while in the relativistic case a high-energy beta-decay spectrum is assumed. (Author)

AD-289 361 Div. 25, 24
(TISTB/MS) OTS price $4.60

Bausch and Lomb, Inc., Rochester, N. Y.
6 INCH f/3.5 AND 9 INCH f/4.5 RADIATION PROTECTED AERIAL RECONNAISSANCE LENSES.
Final rept.
1962, 17p. incl. illus. tables.
(Subcontract to Bendix Systems Div., Bendix Corp., Ann Arbor, Mich., Contract AF 33(616)7071)
Unclassified report

DESCRIPTORS: *Lenses, *Photographic lenses, *Cosmic rays, Tests, Calibration, Design, Photographic filters, Coatings, Aerial reconnaissance, Radiation effects.

Ten lenses were supplied of which four lenses are 6 inch f/3.5 radiation protected and one 6 inch f/3.5 non-protected, and 4 lenses 9 inch f/4.5 radiation protected and one lens 9 inch f/4.5 non-protected. With these lenses red and yellow filters were also supplied. These lenses are the same optical design and construction as supplied on contract AF33(600)-25585 except for changes as specified in Exhibit WCLR 59-18. The exact lens formula and lens correction characteristics were supplied on contract AF33(600)-25585. Mechanical specifications, lenses, and test results have been transmitted to the Procurement Agency. All materials used in fabrication of the above lenses will not become radioactive upon exposure to 10 to the 6th power R. of cobalt-60 gamma radiation. (Author)

AD-289 371 Div. 25, 15
(TISTP/TL) OTS price $2.60

California U., Berkeley.
ON STABILITY OF LINEAR MECHANICAL SYSTEMS,
by S. P. Diliberto. May 62, 26p. (Technical rept. no. 2)
(Contract Nonr-22288)
Unclassified report

DESCRIPTORS: *Linear systems, *Quantum mechanics, *Topology, *Mapping, Differential equations, Perturbation theory, Matrix algebra, Integral equations, Stability.

AD-289 390 Div. 25, 17
(TISTM/BRW) OTS price $1.60

National Research Corp., Cambridge, Mass.
THERMODYNAMIC PROPERTIES OF BI-METALLIC POWDERS.
Quarterly letter rept., 1 July-30 Sep 62,
by Ludwig G. Fasolino. 9 Nov 62, 11p. incl. illus. tables, 6 refs.
(Contract Nonr-360800, Proj. 44-1-0226)
Unclassified report

DESCRIPTORS: *Intermetallic compounds, *Heat of formation, *Powder alloys, Aluminum alloys, Lithium alloys, Combustion, Combustion chamber gases, Thermodynamics, Powder metals, Lithium, Aluminum, Magnesium, Zinc.

The heat of combustion of Li in an O Parr bomb was determined. The initial difficulties encountered when the combustion occurred in the presence of C and/or glass were eliminated. The release of energy closely corresponds to the heat of formation of Li20. The heats of solution of Al, Li and Al-Li alloy were determined in 2 N HCl. From these data the heat of formation of AlLi was calculated. (Author)

AD-289 401 Div. 25, 8
(TISTP/JW) OTS price $1.10

Washington Square Coll., New York U., N. Y.
A STUDY OF THE FAR INFRARED PROPERTIES OF CRYSTALS.
Scientific rept. no. 18, 1 Dec 61-28 Feb 62,
by J. H. Rohrbaugh. 28 Feb 62, 4p.
(Contract AF 19(604)2673)
(AFCRL 62-369) Unclassified report

DESCRIPTORS: *Crystals, *Infrared optical systems, Refraction, Salts.

AD-289 402 Div. 25, 2
(TISTP/JW) OTS price $1.60

Chicago U., Ill.
(No title).
Final rept., 1 Jan 55-15 June 62,
by Masatoshi Koshiba. 15 June 62, 18p.
(Contract N6ori-02055)
Unclassified report

DESCRIPTORS: *Cosmic rays, *Balloons, Energy.

AD-289 405 Div. 25
(TISTP/JW) OTS price $6.60

United Research, Inc., Cambridge, Mass.
TECHNIQUES AND EQUIPMENT FOR DETERMINING DYNAMIC PROPERTIES OF SOILS.
Interim rept.,
by James V. Zaccor. July 62, 45p. illus. (USR rept. no. B155-24)
(Contract DA 49-146-xz-019)
Unclassified report

DESCRIPTORS: *Soils, *Dynamics, *Loading, Stresses.

AD-289 409 Div. 25
(TISTP/JW) OTS price $4.60

Illinois U., Urbana.
TRANSMISSION AND LINE BROADENING IN MOSSBAUER EFFECT. II,
by S. Margulies, P. Debrunner, and H. Frauenfelder. 1962, 41p.
Unclassified report

DESCRIPTORS: *Statistical processes, *Transmissions, Absorption, Displacement reactions.

AD-289 412 Div. 25, 15
(TISTP/JW) OTS price $4.60

Yale U., New Haven, Conn.
(No title).
Status rept.,
by Henry Margenau. 1 Apr 59, 1v.
(Contract AF 18(603)15)
(AFOSR TN 60-778) Unclassified report

DESCRIPTORS: *Ionization, *Plasma physics, Integrals, Distribution, Temperature, Density.

AD-289 414 Div. 25
(TISTP/JW) OTS price $1.10

Ecole Normale Superieure (France).
SOME REMARKS ON K(+)2 PI AND K(+)e4 DECAYS,
by K. Chadan and F. M Renard. June 62, 5p.
(Technical note no. 5)
(Grant AF-EOAR 62-10)
Unclassified report

DESCRIPTORS: *Deterioration, *Particles, Resonance.

AD-289 418 Div. 25, 9
(TISTP/JW) OTS price $1.10

Boston U., Mass.
THEORETICAL INVESTIGATIONS ON THE CORRELATION THEORY OF ELECTROMAGNETIC FIELDS.
Final rept., 1 Feb 61-31 Jan 62,
by P. Roman. Feb 62, 7p.
(Contract AF 19(604)8022, Projs. 5631 and 5632)
(AFCRL 62-92) Unclassified report

DESCRIPTORS: *Electromagnetic fields, *Correlation techniques, Vector analysis, Optical analysis.

AD-289 420 Div. 25, 20
(TISTP/JW) OTS price $1.10

Argonne National Lab., Lemont, Ill.
MAGNETIC MOMENT OF THE LAMBDA,
by W. Kernan, T. Novey and others. 1961, 7p.
Unclassified report

Presented at the 1962 International Conference on High Energy Physics at CERN, 4-11 July 1962.

DESCRIPTORS: *Magnetic moments, *Mesons, Symposia, Polarization, Beams.

AD-289 424 Div. 25
(TISTP/JW) OTS price $1.10

Bendix Systems Div., Bendix Corp., Ann Arbor, Mich.
PHOTO-IONIZATION EQUILIBRIUM IN A CESIUM VAPOR CLOUD,
by A. O. Kresse. 9 Apr 62, 5p. (BSC rept. no. 30645; FS-62TN-1029)
(Contract AF 04(694)26)
Unclassified report

DESCRIPTORS: *Ionization, *Equilibrators, Cesium, Clouds, Vapors.

AD-289 426 Div. 25
(TISTP/JW) OTS price $1.10

Hebrew U. (Israel).
ANALYSIS OF ELLIPTICALLY POLARISED LIGHT,
by D. Bergman. Dec 61, 5p. (Technical (Scientific) Note no. 4)
(Contract AF 61(052)279)
(AFCRL 62-649) Unclassified report

DESCRIPTORS: *Light, *Polarization, Ellipsoids, Analysis.

AD-289 427 Div. 25, 15
(TISTP/JW) OTS price $1.10

Vienna U. (Austria).
ON A POSSIBLE XI-PI RESONANCE,
by A. P. Balachandran and H. Pietschmann.
30 June 62, 4p. (Scientific note no. 15)
(Contract AF 61(052)265)
Unclassified report

DESCRIPTORS: *Resonance, *Particles, Applied mathematics, Equations.

AD-289 432 Div. 25
(TISTP/JW) OTS price $4.60

Massachusetts Inst. of Tech., Cambridge.
AN INVESTIGATION OF NEGATIVE ION PRODUCTION.
Master's thesis,
by John Albert Schira, Jr. and Leo Warren Stockham. June 62, 35p.
Unclassified report

DESCRIPTORS: *Ionization, *Gases, Electrons, Density, Electrostatics, Surfaces, Theses.

AD-289 435 Div. 25
(TISTP/JW) OTS price $1.10

Iowa Engineering Experiment Station, Ames.
HEAT CAPACITY LAG IN HEAVY GASES.
Final rept.,
by Sam Legvold and John R. Olson. June 62, 2p.
(OSR Proj. no. 9751)
(AFOSR 2766) Unclassified report

DESCRIPTORS: *Gases, *Relaxation time, Equations, Heat of formation.

AD-289 436 Div. 25
(TISTP/JW) OTS price $1.10

Queen's U., Belfast (Gt. Brit.).
ELECTRON COOLING IN THE D REGION,
by A. Dalgarno and R. J. Moffett. 1962, 8p.
(Contract AF 61(052)131)
(AFCRL 62-679) Unclassified report

DESCRIPTORS: *Cooling, *Electron bombardment, Radio waves, Energy.

AD-289 438 Div. 25
(TISTP/JW) OTS price $1.60

Institute of Mathematical Sciences, New York U., N. Y.
(No title).
Final rept., 1 Mar 58-28 Feb 62,
by Robert H. Kraichnan. June 62, 13p.
(Contract AF 49(638)341, Proj. 47501)
(AFOSR 2779) Unclassified report

DESCRIPTORS: *Turbulence, *Fluid mechanics, Motion, Microscopy, Particles, Mathematical logic.

AD-289 449 Div. 25
(TISTP/JW) OTS price $1.10

California U., Los Angeles.
FLUID MOTION AND SOUND.
Annual summary rept., 1 May 61-30 Apr 62,
by Alan Powell, T. J. B. Smith and others.
July 62, 6p. (Rept. no. 62-38)
(Contract Nonr-23362, Proj. NR 062-299)
Unclassified report

DESCRIPTORS: *Fluid flow, *Sound, Jets, Resonance, Aerodynamics, Motion.

AD-289 520 Div. 25
(TISTP/ODN) OTS price $3.60

Allegany Ballistics Lab., Hercules Powder Co., Cumberland, Md.
MEASUREMENT OF PARTICLE SIZE IN A GAS-PARTICLE FLOW BY AN OPTICAL TRANSMISSION TEST.
Final rept.,
by Richard A. Dobbins. Oct 62, 33p. incl. illus. 12 refs. (Rept. no. ABL/X-84)
(Contract NOrd-16640)
Unclassified report

DESCRIPTORS: *Gases, *Particles, Optics, Transmission, Exhaust gases, Errors, Theory, Fuel additives, Scattering, Rocket motors, Metallic compounds, Oxides.

An experimental method of determining the volume-to-surface mean diameter, D32, in a gas-particle flow is described. The method involves the use of an experimental determination of optical transmission and the use of the primary dependence of the average scattering coefficient on D32. An error analysis was performed to show the manner in which errors propagate in the data reduction process. The optical depth due to particles produced in the gas-particle flow resulting from solid propellant rocket motors using metallic fuel additives was found to vary strongly with particle size. The theory is applied to experimental data recently published and the provisional results between actual D32 and the value yielded by transmission tests are considered very encouraging. Instrumentation is described to perform transmission tests on rocket exhaust gases where particles are strong emitters of thermal radiation and where the optical depth of the particle cloud is moderate. (Author)

AD-289 525 Div. 25
(TISTP/TL) OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
INVESTIGATION OF GAS LASERS.
Semiannual technical rept., 1 Jan-30 June 62,
by T. S. Hartwick. Sep 62, 6p. incl. illus.
5 refs. (Rept. no. TDR-69(2250-21)TR-1)
(Contract AF 04(695)69)
(DCAS TDR 62-194) Unclassified report

DESCRIPTORS: *Lasers, *Gases, *Helium, *Neon, Glow discharges, Pressure, Image converter tubes, Infrared gas analyzers, Diffraction.

A He-Ne gas laser operating at 1.15 microns was constructed and operated successfully. The laser performance was studied experimentally. Preparations were made for testing a visible He-Ne laser. An experimental investigation of a novel method for pumping the laser with a cold cathode discharge was initiated. (Author)

AD-289 529 Div. 25, 9
(TISTP/WH) OTS price $9.60

Air Force Cambridge Research Labs., Bedford, Mass.
THE HYDROMAGNETIC WAVE TUBE: THEORETICAL INVESTIGATION OF MODE STRUCTURES,
by D. J. Decourcy, Jr. and M. H. Bruce. Aug 62, 109p. incl. illus. tables, 7 refs. (Repi. no. AFCRL 62-550)
(Proj. 5633)
Unclassified report

DESCRIPTORS: *Ionospheric models, *Plasma physics, *Magnetohydrodynamics, *Ionospheric propagation, *Electric fields, *Instrumentation, Coaxial cables.

Instrumentation has been designed and constructed to allow experimental investigation of ionospheric motions. This device is called the Hydromagnetic Wave Tube. The principal purpose of this report is to theoretically determine the basic modal patterns of the electric and magnetic fields under operating conditions and to determine the propagation characteristics of these fields as functions of the static magnetic field, the ionization concentration, and the frequency of the perturbing source. Brief outlines of the over-all project and the physical construction of the Hydromagnetic Wave Tube are also included. (Author)

AD-289 535 Div. 25, 17
(TISTM/AJM) OTS price $9.60

Keck, W. M., Lab. of Engineering Materials, Calif. Inst. of Tech., Pasadena.
THE INFLUENCE OF TEMPERATURE AND PREFERRED ORIENTATION ON HALL COEFFICIENT AND RESISTIVITY OF PURE TITANIUM,
by Louis C. Roesch. Nov 62, 111p. incl. illus. tables, 3 refs.
(Contract AF 49(638)1034)
Unclassified report

DESCRIPTORS: *Titanium, Low temperature research, Hall effect, Resistance, Temperature, Crystal structure, Single crystals, Theory, Tests, X-ray diffraction analysis, Photographic analysis, Mathematical analysis, Electrical conductance, Test equipment, Cryostats, Electrical properties.

The Hall coefficient is found to depend strongly on temperature and crystalline texture. At room temperature it has a value of -1.8 x 10 to the minus eleventh power cu m/coulomb in two specimens, whereas in the third it equals 1.2 x 10 to the minus eleventh power cu m/coulomb. Several factors including impurities, changes in the scattering mechanism, size effects, crystallographic anisotropy, which could account for the observed differences, are discussed and it is proposed that crystallographic orientation is the most influential factor. From the measured data and a phenomenological theory of the Hall effect developed in the case of single crystals, values of the components of the galvanomagnetic tensor, which replaces the scalar Hall coefficient of isotropic media, are calculated and discussed in connection with a possible model of the Fermi surface of titanium. (Author)

AD-289 554 Div. 25
(TISTM/ODN) OTS price $3.60

Hebrew U. (Israel).
RESEARCH ON OPTICS OF SELECTIVE SURFACES.
Annual rept. no. 2, 1 Sep 60-31 Mar 62,
by H. Tabor. 31 Mar 62, 34p. incl. illus. table, 14 refs.
(Contract AF 61(052)279)
(AFCRL 62-1045) Unclassified report

DESCRIPTORS: *Optics, *Thin films, *Metal films, Nickel, Reflection, Structures, Surfaces, Electroplating, Electroplating solutions, Nickel compounds, Zinc compounds, Ammonium radicals, Sulfides, Sulfates, Solar energy, Thiocyanates, Deposits, Mathematical analysis, Chemical analysis, Absorption, Electroposition.

The report concerns a study of selective black surfaces suitable for solar energy absorbers and limited primarily to surfaces produced by electro-deposition from solutions containing Ni and SO4 or CNS radicals. It presents results obtained and includes a considerable amount of general experimental information in the form of appendices. (Author)

AD-289 557 Div. 25
(TISTM/EJH) OTS price $5.60

Ohio State U., Research Foundation, Columbus.
THE CONDUCTANCE AND DIELECTRIC CONSTANTS OF SILVER IODIDE, SILVER IODOMERCURATE AND CUPROUS IODOMERCURATE,
by Paul Splitstone and P. M. Harris. Aug 62, 10p. incl. illus. tables, 22 refs. (Technical rept. no. 2)
(Contract AF 49(638)397)
Unclassified report

DESCRIPTORS: *Dielectrics, *Silver compounds, *Mercury compounds, *Iodine compounds, *Copper compounds, Single crystals, Iodides, Dielectric properties, Conductivity, Relaxation time, Polarization, Transport properties, Lattices, Phase transitions, Electrical properties.

The capacitances and loss factors of beta-Cu2HgI4 and AgI (as briquets) have been measured in the frequency range 100 to 100,000 cps and at each of several temperatures below room temperature. Arguments are presented to show that all three of these substances are not simple dielectrics but are characterized by relaxation processes having two (or more) relaxation times. In all three substances the magnitude of the conductance increases with frequency (at constant temperature) as would be expected of a substance whose polarization is accompanied by dissipation. It is suggested that transport and polarization by ion displacement occurs by escape of ions from tetrahedral sites of the iodine lattice to octa-

hedral sites of the iodine lattice to octahedral sites in which the polarizability is expected to be much higher and that this escape probability may be greatly enhanced by the presence of anion defects. (Author)

AD-289 568 Div. 25
(TISTP/JW) OTS price $2.60

Institute of Metals and Explosives Research, U. of Utah, Salt Lake City.
ELECTRICAL AND PLASMA PHENOMENA ACCOMPANYING DETONATION.
Final rept., 1 Oct 61-30 Sep 62,
by M. A. Cook and R. T. Keyes. 30 Sep 62, 19p. incl. illus. 7 refs.
(Contract AF 49(638)1061)
Unclassified report

DESCRIPTORS: *Plasma physics, *Electrical effects, *Detonation, Conductivity, Ionization, Chemical properties, Explosions.

The investigations carried out fall under the following general classifications: (1) ionization and electric/l conductivity and its relationship to the deflagration to detonation transition in solid explosives, (2) chemical reaction rates and the shock initiation of detonation of liquid explosives, (3) mechanism of the ''flash-across'' phenomenon in the card-gap test for liquid explosives, and (4) spectrographic studies of external detonation-generated plasmas. (Author)

26. PRODUCTION AND MANAGEMENT

AD-287 907 Div. 26, 17, 1
(TISTM/BRW) OTS price $3.60

Northrop Corp., Hawthorne, Calif.
DEVELOPMENT OF IMPROVED METHODS, PROCESSES, AND TECHNIQUES FOR PRODUCING STEEL EXTRUSIONS.
Interim engineering rept. no. 13, 1 July-30 Sep 62,
by L. M. Christensen. 30 Sep 62, 28p. incl. illus. (Rept. no. NOR-62-216)
(Contract AF 33(600)36713)
Unclassified report

DESCRIPTORS: *Steel, Processing, Drawing (Machine processing), Alloys, Airframes, Mechanical properties, Thickness, Heat treatment, Deformation, Stainless steel, Extrusion.

Both H-11 and PH15-7Mo were successfully warm drawn through four successively smaller draw dies to a thickness of 0.040 ± 0.003 in. The warm drawing process cannot be considered optimized because of a high attrition rate in point preparation. The loss of load carrying capability in the point and shoulder area is critical when working with sections of 0.05 in. thick and less. Sections of 0.06 in. and larger are not appreciably affected. A potential solution to this critical problem is the development of a means of raising the strength level in the point and shoulder area only. Intermediate annealing between draw passes appears beneficial in reducing draw loads when working with such thin sections. The amount of deformation around the periphery of the cross section must be relatively equivalent. Designed experiments with straightening of PH15-7Mo disproved a previously held belief, and concluded chevrons are caused by lubrication failure. Constant speed, constant power input with the induction heater is a satisfactory means of obtaining temperature control within limits liberalized by necessity to ± 50 F. (Author)

AD-288 019 Div. 26, 17
(TISTM/BRW) OTS price $2.25

Westinghouse Electric Corp., Blairsville, Pa.
COMPARISON OF HIGH ENERGY RATE (DYNAPAK) AND CONVENTIONAL EXTRUSION OF REFRACTORY METALS.
Final rept., Mar 61-Mar 62,
by Dirk G. Rabenold. Sep 62, 90p. incl. illus. tables, 6 refs.
(Contract AF 33(616)7842, Proj. 7381)
(ASD TDR 62-506) Unclassified report

DESCRIPTORS: *Refractory materials, *Heat resistant alloys, Industrial equipment, Metal forming presses, Explosive forming, Molybdenum alloys, Tungsten alloys, Zirconium alloys, Niobium alloys, Processing, Mechanical properties, Surface properties, Crystallization, Phase transitions, Deformation, Alloys, Microstructure, Extrusion.

A comparison was made of the surface quality, dimensions, chemistry, hardness, tensile properties, and recrystallization behavior of extrusions produced on a Model 1810 Dynapak high-velocity machine and on a 700-ton Loewy high speed extrusion press. Three temperatures were established which represented hot work, cold work, and a combination of hot and cold work, by making preliminary extrusions on the Dynapak machine. Arc cast billets, with a nominal diameter of 3 in. of two refractory alloys, a Mo-25W-0.1Zr alloy and a W-0.6Cb alloy, were then extruded at a constant 4/1 reduction ratio from the same three temperatures on both machines. The results of this work indicate that equally good surfaces can be obtained from either process when proper lubrication and die preparation techniques are used; a lower hot working temperature can be used for high-velocity extrusions; and, a lower recrystallization temperature is obtained in material cold worked on the Dynapak. The latter fact indicates that high-velocity-extruded metals retain a high degree of internal stress than conventionally-extruded metals. (Author)

AD-288 122 Div. 26, 17
(TISTM/BRW) OTS price $1.10

McDonnell Aircraft Corp., St. Louis, Mo.
MOLYBDENUM STRUCTURAL COMPONENT PROGRAM.
Progress rept., 1 Aug-1 Nov 62.
1 Nov 62, 6p. incl. illus. tables.
(Contract NOw 61-0653-t)
Unclassified report

DESCRIPTORS: *Molybdenum alloys, *Sheets, Band saws, Saw blades, Contamination, Tungsten, Titanium alloys, Airframes, Structures, Chemical milling, Processing.

Fifty-six 0.06 X 2.5 X 3.0 in. specimens (Mo.-0.5% Ti alloy) were sawed with a mild steel back-up. The number of teeth per in. (TPI) and speed of the saw cuts were varied. The 32 TPI blade was tried with low, high, and

medium saw speeds, all giving unsatisfactory results. The slow speed was the more usable of the three. The course tooth (10 TPI) blade was tried next with rough laminated edges resulting at slow speeds and high heat and rapid dulling of the blade at high speeds. In changing to the 24 TPI blade it was found that at very slow speeds the teeth broke. The best results were at 120 surface ft/min (SFPM) with the edges becoming rougher and the blade dulling more rapidly as the saw speed was increased. The blade was ruined rapidly (1/8 to 1/4 in. cut) at 1550 SFPM. It was decided that a finer tooth (32 TPI) would give better results and the speed should be the 120 SFPM that gave the best results for the 24 TPI. In comparing the 120 SFPM 32 TPI cut with the 24 TPI cut at the same speed, more material could be sawed before changing blades and smoother edges were obtained using the 32 TPI. It was concluded that a saw speed of 120 SFPM combined with HSS 32 TPI blade gave the smoothest lamination free sawed edge. (Author)

AD-288 137 Div. 26, 14
(TISTM/BRW) OTS price $7.60

SKF Industries, Inc., Philadelphia, Pa.
INFLUENCE OF LUBRICATION ON ENDURANCE OF ROLLING CONTACTS.
Progress rept. no. 4, 22 Apr-22 Sep 62,
by N. E. Sindlinger, J. A. Martin and others.
22 Sep 62, 74p. incl. illus. 12 refs. (Rept. no. AL62T015)
(Contract NOw 61-0716-c)
Unclassified report

DESCRIPTORS: *Ball bearings, *Lubrication, Theory, Elasticity, Hydrodynamics, Deformation, Films, Electrical conductance, X-ray spectroscopy, Tracer studies, Metals, Surfaces, Transport properties, Bearings, Roller bearings, Pressure, Test equipment.

Recent extensions of elastohydrodynamic lubrication theory for line contact are reviewed. A much wider range of rolling speeds is covered than has previously been available. The conductivity technique as applied to the 4-ball tester was refined to the point where an accurate reflection of contact phenomena at a single point contact between 2 balls is obtained. Data on speed, load, and viscosity influences are given, suggesting that elastohydrodynamic concepts sufficiently describe the load transmittal through the contact even when the lubricant film is being disrupted by surface asperity contacts up to half of the time. Observations of horseshoe shaped markings in the ball track were correlated with a kinematic theory and it appears that the measured shape and size of these surface markings correlate well with the theoretical values, assuming that the marking extends over the entire region over which the asperity contact is in the Hertzian region of close approach of the two surfaces. Radioactive wear tests in the 4-ball tester showed that progressive wear continues with running time at low speeds corresponding to complete breakdown of the hydrodynamic film. (Author)

AD-288 141 Div. 26, 17, 22
(TISTM/EJH) OTS price $3.60

Bonney-Floyd Co., Columbus, Ohio.
PRODUCTION OF HIGH STRENGTH CAST STEEL SUSPENSION ARMS FOR (T95 MEDIUM TANK) TRACKED VEHICLES.
Final rept.,
by C. D. Robinson. Apr 62, 33p. incl. illus. tables, 4 refs.
(Contract DA 33-019-ORD-3398)
Unclassified report

DESCRIPTORS: *Castings, *Casting, *Steel, *Tanks, Mechanical properties, Tracked vehicles, Manufacturing methods, Molding, Heat treatment, Non-destructive testing, Melting, Welding, Machining.

High strength steel castings are produced in the production foundry by following a manufacturing procedure which relates each production operation to the function of the casting being produced. This manufacturing procedure is based on the fact that slight modifications of normal production techniques can produce useful steel castings at the 170,000 psi minimum yield strength level if proper control of processing operations is exercised. Design information is used to develop a foundry practice which promotes solidification of homogeneous metal in critical areas. The additional manufacturing operations, molding, melting, heat treating and inspection, are all used to obtain and retain the properties designed into the high-strength steel casting. (Author)

AD-288 233 Div. 26, 17
(TISTM/BRW) OTS price $8.10

Metcut Research Associates, Cincinnati, Ohio.
MACHINING OF REFRACTORY MATERIALS.
Technical engineering rept. on Phase 2, 1 Aug-31 Oct 62,
by N. Zlatin, M. Field, and J. Gould. Nov 62, 76p. incl. illus.
(Contract AF 33(600)42349)
(ASD TR 7-532a, vol. 8)
Unclassified report

DESCRIPTORS: *Refractory materials, Steel, Titanium alloys, Aluminum alloys, Chromium alloys, Vanadium alloys, Nickel alloys, Lathes, Milling machines, Drilling machines, Taps, Reamers, Grinders, Heat resistant alloys, Alloys, Machining.

An evaluation of a Tornetic drilling unit and tapping unit is in progress. The torque and speed characteristics of these units were determined. Comparative drilling tests using the Tornetic drilling unit and a constant feed and speed drill press were made on 4340 steel quenched and tempered to 52 Rockwell C, B-120VCA Ti solution treated and aged to 400 BHN and Rene 41 solution treated and aged to 370 BHN. Conventional machining studies were performed on B-120VCA Ti in the solution treated condition (285 BHN), and the aged condition (400 BHN). The investigation consisted of turning, face milling, end milling, drilling, reaming, tapping and grinding tests. (Author)

AD-288 234 Div. 26
(TISTM/EJH) OTS price $5.60

Oklahoma State U. School of Mechanical Engineering, Stillwater.
AN EXPERIMENTAL EVALUATION OF THE SINTERED TYPE FILTER MEDIA.
Rept. no. 2, Phase 1, 1 Sep 59-31 May 60 on Fluid Contamination Project,
by A. G. Comer, O. L. Burchett and others.
May 60, 47p. incl. illus, table.
(Contract AF 34(601)5470)
Unclassified report

DESCRIPTORS: *Hydraulic fluid filters, *Hydraulic systems, Porous filters, Particulate filters, Sintering, Metals, Metallic textiles, Spheres, Contamination, Test methods, Aircraft.

It was concluded that the maximum particle size and the contaminant capacity test gave the most reliable and reproducible indication of an actual

performance of a filter element in a hydraulic system. Results of these tests correlated well with the bubble test results in most cases. The bubble test should not be attempted on dirty filters or filters that have not been completely cleaned, since some of the pore openings may be blocked. The circuit used in the performance test is believed to simulate a typical hydraulic system. The size range of the actual contaminant introduced during the test should extend well above and below the nominal pore size of the element. Test results indicate that the sintered-type element has a greater contaminant capacity and a greater resistance to high temperature and pressure fluctuations. The differential pressure required to rupture these elements is significantly higher than the differential pressure required to rupture other filter media. The size of the particles passing through the filter elements decreased slightly or remained constant up to the contaminant capacity of the element. (Author)

AD-288 256 Div. 26, 14
(TISTM/BRW) OTS price $7.60

Oklahoma State U., School of Mechanical Engineering, Stillwater.
A CONTINUATION OF THE STUDY IN THE FIELD OF FLUID SEALS FOR HIGH-SPEED ROTATING EQUIPMENT.
Rept. no. 2, 1 Sep 59-31 Aug 60,
by R. E. Chapel, L. E. Hall, and B. J. Livesay.
Aug 60, 61p. incl. illus.
(Contract AF 34(601)5470)
Unclassified report

DESCRIPTORS: *Seals, *Gaskets, Rotating structures, Rotary seals, Test facilifies, Fuel seals, Aircraft equipment, Shafts, Pressure, Surfaces, Carbon seals, Metal seals.

The principal objective of this phase of the fluid seals study was the design, fabrication, and functional testing of a test facility. The facility was to be used for simulated operational tests on various types of face seals that are found in many units of aircraft equipment. The test facility had to have provisions for variable rotational speed and operating pressure. The facility was designed to be flexible in its application to permit its usage for various types of face seal assemblies. The test facility has been functionally tested with satisfactory results. For economic reasons, the original maximum operating speed of 30,000 rpm was discarded. A unit capable of this operating speed required a special lubrication system, and the price of this unit was far in excess of the original estimate. A variable-speed unit capable of 25,000 rpm maximum speed was obtained since its cost was near the estimated value in the original project proposal. To provide for a higher rotational speed a flat belt speed increaser has been designed, and fabrication of this unit has begun. (Author)

AD-288 271 Div. 26
(TISTM/BRW) OTS price $11.00

Oklahoma State U. School of Mechanical Engineering, Stillwater.
STUDY IN THE FIELD OF FLUID CONTAMINATION AND THE METHODS REQUIRED TO RESTORE AND EVALUATE THE CONTAMINANT CAPACITY OF USED FILTER ELEMENTS.
Rept. no. 5 on Fluid Contamination Project,
by E. C. Fitch, H. E. Chapel and others.
Aug 62, 139p. incl. illus. tables, 12 refs.
(Contract AF 34(601)9879, continuation of Contract AF 34(601)5470)
Unclassified report

DESCRIPTORS: *Oil filters, Cleaning, Cleaning fluids, Contamination, Ultrasonics, Quality control, Hydraulic systems.

Progress is reported on methods and procedures to implement production cleaning of filter elements. Two methods were established for maintaining quality control of the cleaning process. A first inspection gives the surface cleanliness of the element and insures that the final phase of the cleaning process removes all loose contaminants to a prescribed level. A second inspection gives the interstitial cleanliness of the element pore spaces. This test permits an assessment of the degree of flow area open through the element, and appropriate values can be established for a given P/N to provide a go, no-go check. (Author)

AD-288 534 Div. 26, 15
(TISTP/WH) OTS price $2.60

Northwestern Technological Inst., Evanston, Ill.
CRITICAL PATH ANALYSES VIA CHANCE CONSTRAINED AND STOCHASTIC PROGRAMMING,
by A. Charnes, W. W. Cooper, and G. L. Thompson.
July 62, 20p. incl. illus. table, 11 refs. (ONR Research memo. no. 62)
(Contract Nonr-122810, Proj. NR 047-021; In cooperation with Carnegie Inst. of Tech. Graduate School of Industrial Administration, Contract Nonr-76001, Proj. NR-047011)
Unclassified report

DESCRIPTORS: *Linear programming, *Scheduling, *Analysis of variance, *Statistical analysis, Management engineering.

A question which combines statistics and linear programming considerations was first raised by G. Tintner (Econometrica 28:2, 490-5, April 60). It concerns the distribution of optimum functional values when a linear programming problem has probabilistic constraints. It is proposed to accord a chance constrained programming formulation to this kind of problem and to deal with it in a way that bears on project scheduling of the kind that is usually associated with critical path analysis, for instance, in PERT. The main focus of this paper is on the statistical distributions of the project completion (and subcompletion) times. The question of total time distributions that we deal with can therefore be given a managerial policy flavor by assuming that, ab initio, a management is considering a contract for a certain project. The task sequences are known but the times are not known except in probability. Before contracting for a target completion date--with resulting delay penalties--this management would like to know the likely distribution of total times in order to decide whether to accept an offered contract or else bargain further on the completion dates, penalty rates and progress payments and prices. (Author)

AD-288 540 Div. 26, 14
(TISTM/BRW) OTS price $10.50

Oklahoma State U., School of Mechanical Engineering, Stillwater.
A CONTINUATION OF THE STUDY IN THE FIELD OF FLUID SEALS FOR HIGH-SPEED ROTATING EQUIPMENT.
Report no. 3, 11 Oct 60-31 Aug 61 on Fluid Seals Project,
by R. E. Chapel, R. B. Morrow, and F. M. Welsh.
Aug 61, 132p. incl. illus. 21 refs.
(Contract AF 34(601)5470)
Unclassified report

DESCRIPTORS: *Oil seals, Rotating structures, Rotary seals, Shafts, Fuel seals, Aircraft equipment, Hydraulic systems, Hydraulic seals, Test facilities, Metal seals, Fluids, Hydraulic fluids, Pressure, Surfaces, Carbon seals.

From a continued surveillance of technical literature, vendor information and analysis of various fluid seal problems, the fluid seal problem in general seems to be reaching a point of status quo. Research is being continued on seal applications involving super parameter requirements, rotating speed, pressure, temperature, and special fluids, but the applications for the majority of aircraft accessory situations seems to be fairly well solved. Speeds of 25,000 to 40,000 rmp, pressures as high as 300 psi, and conventional fluids, such as hydraulic fluid, jet engine fuel, seem to offer little problem in sealing with present day seal designs. (Author)

AD-288 558 Div. 26, 14
(TISTM/BRW) OTS price $1.10

General Dynamics/Fort Worth, Tex.
PIPE THREAD SEALANT QUALIFICATION.
Process Control test rept.,
by W. M. Young. 30 Oct 62, 3p. (Rept. no. PCTR-4488)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Pipe fittings, *Seals, Hydraulic systems, Antiseize compounds, Sealing compounds, Tests, Hydraulic fluids, Screw threads, Ethylenes, Fluorides, Polymers.

An investigation was made to find a suitable material, unaffected by Oronite 8515, to seal pipe threads at pressures up to 5,000 psi and exposure to 350 F. Several commercial thread sealing compounds and sealants were tested and each failed. The only suitable seal was obtained by wrapping a single thickness of Permacel teflon tape around the male threads before joining the fittings. In joining the fittings the tape is cut into rings inside the threads; and therefore there is the possibility of some of the rings entering the system. (Author)

AD-288 564 Div. 26
(TISTM/EJH) OTS price $1.60

General Dynamics/Fort Worth, Tex.
HYDRAULICS - FITTINGS, Q2758 - PRELIMINARY CHECK OF ANTI GALL FINISHES.
Test data memo.,
by P. J. Slover. 30 Oct 62, 11p. incl. illus.
(Rept. no. FTDM-1953)
(Contract AF 33(657)7248)
Unclassified report

DESCRIPTORS: *Disconnect fittings, Coatings, Plating, Nickel plating, Aluminum, Steel, Friction, Tests.

Galling characteristics of Q2758 fittings were investigated in order to evaluate proposed surface finishes. Six Q2758-893-5 fittings were submitted as specimens. Two of these specimens were treated per Convair surface finish ''A'', (change 3, Q-2758 Standard), two were treated per Convair surface finish ''B'', (anodized), and two were as delivered. One specimen of each surface finish was mated with an Al tee, and one specimen of each surface finish was mated with a steel tee which had been stripped of Cd plating and plated with Ni. Only the threads and lip at the end of the fittings were plated. Each specimen was torqued up to specified values 19 times and the breakaway torque was noted as the fitting was removed each time. No excessive breakaway torques were recorded. The Al tees showed slight signs of wear, but no fitting or tee developed sufficient roughness to noticeably interfere with removal or installation. The plated lip on the steel tees showed some tendency to peel. All specimens and fittings were in usable condition at the completion of the test. (Author)

AD-288 636 Div. 26, 30
(TISTB/MS) OTS price $5.00

Republic Aviation Corp., Farmingdale, N. Y.
A STUDY OF THE AIR FORCE MAINTENANCE TECHNICAL DATA SYSTEM.
Final rept.,
by J. E. Losee, R. H. Allen and others. Aug 62, 197p. incl. illus. tables, 5 refs.
(Contract AF 33(616)8193, Proj. 7184)
(AMRL TDR 62-85) Unclassified report

DESCRIPTORS: *Maintenance, *Air force operations, *Management engineering, Human engineering, Public opinion polls, Data, Analysis.

Research on preparation, production, distribution, evaluation and verification of Air Force maintenance technical data is reported. The impact of management on the procurement of accurate, timely, and economical data is discussed. Areas in which management was found to be deficient are given. Specific shortcomings in the data, in its preparation, distribution, and use are related. Actions considered necessary to first, improve management of the overall technical order system, and second, to enhance the quality, usefulness, and timeliness of the data produced are recommended. (Author)

AD-288 638 Div. 26, 17
(TISTM/BRW) OTS price $7.60

Westinghouse Electric Corp., Blairsville, Pa.
HIGH ENERGY RATE EXTRUSION.
Interim technical progress rept. no. 8 on Phase 2, 1 Aug-1 Nov 62,
by J. M. Rippel. 1 Nov 62, 79p. incl. illus. tables, 2 refs.
(Contract AF 33(600)41948)
(ASD TR 7-882, vol. 8) Unclassified report

DESCRIPTORS: *Metals, *Explosive forming, *Extrusion, Titanium alloys, Aluminum alloys, Vanadium alloys, Steel, Stainless steel, Airframes, Metal forming presses, Alloys.

The limitations upon the obtainable length of target extrusions improved by the phenomenon of inertial separation were further reduced. New tooling was designed which has almost completely avoided inertial separation on the 2- by 1- by .050-inch Tee extrusion of Ti-6Al-4V and, thus, virtually eliminated the need for a brake for this target extrusion. This tooling has also reduced the braking requirements for steel extrusions and thus made the solution to this problem less difficult. The investigation of the effect of die design on extrusion pressure was completed on dies with included angles of 180 to 60 degrees. Tensile properties of Ti-6Al-4V alloy were determined. The analysis of braking devices was completed. (Author)

AD-288 640 Div. 26, 17
(TISTM/ODN) OTS price $3.60

Western Gear Corp., Lynwood, Calif.
HIGH ENERGY RATE FORGING DEVELOPMENT.

Interim technical progress rept. no. 4, 10 Feb-10 Oct 62,
by J. M. Palsulich and R. Hall. Oct 62, 27p. incl. illus. tables (Rept. no. 6207-208) (Contract AF 33(600)42523; In cooperation with Precision Forge Co.)
(AMC TR 7-866, vol. 4) Unclassified report

DESCRIPTORS: *Forging, *Tungsten, *Molybdenum alloys, *Refractory materials, *Heat resistant alloys, Dies, Alloys, Industrial equipment, Preparation, Sintering, High temperature research, Metals, Crystallization, Heat treatment, Pressure, Temperature, Rocket motor nozzles, Sintered alloy.

High-energy-rate forging techniques can be successfully used to open die forge commercially pure W and the TZM Mo alloy. It is not necessary to have wrought billet stock for this type of forging process. Successful closed die forging of the TZM Mo alloy has been accomplished. Most of the difficulties encountered in closed die forging of W have been overcome. When using the high-energy-rate forging process, forging temperatures need not exceed 2500 F for W and 2200 F for the TZM Mo alloy. Under identical forging conditions it was found that arc melted and centrifugally cast billets were less susceptible to forging defects, and generally presented fewer problems from a forging standpoint. (Author)

AD-288 704 Div. 26
(TISTM/TCG) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
WELDING CYLINDERS OF STEAM TURBINES MADE FROM BRANDS 20KhMFL AND 15Kh1M1FL PERLITE GLASS STEEL,
by S. A. Sukach. 15 May 62, 11p. (Trans. no. FTD-TT-62-577 from Coll. of Art: 'Nekotorye Voprosy Tekhnologii Proizvodstva Turbin' Drobilko, G. A. (Editor), Leningradskiy-Dvezhdy Ordena Lenina Metallicheskiy Zavod. Mashgiz. Moscow-Leningrad, No. 7, pp. 248-253, 1960)
Unclassified report

DESCRIPTORS: *Welding, *Heat resistant alloys, *Steel, *Steam turbines, Creep, Pearlite, Mechanical properties, USSR, Manufacturing methods, Processing.

AD-288 706 Div. 26
(TISTM/TCG) OTS price $5.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ACTIVE INSPECTION ON MODERNIZED MACHINE TOOLS,
by V. G. Korobenyikov, B. A. Sak-Shak and others. 19 June 62, 50p. (Trans. no. FTD-TT-62-133 from Avtomatizatsiya Universal'nykh Metallorezhushchikh Stankov, Moskva, pp. 119-139, 146-158, 1960)
Unclassified report

DESCRIPTORS: *Machine tools, *Quality control, Automation, Machining, Manufacturing methods, Cutting tools, Production, Processing, Machines.

AD-288 707 Div. 26
(TISTM/TCG) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CERTAIN PROBLEMS IN THE THEORY OF HYDROSTATIC RADIAL BEARINGS,
by N. P. Chernousov. 11 May 62, 16p. (Trans. no. FTD-TT-62-335 from Khimicheskoye Mashinostroyeniye, No. 2, pp. 17-22, 1961)
Unclassified report

DESCRIPTORS: *Bearings, *Hydrostatic pressure, *Theory, Chemical industry, Industrial equipment, Friction, Viscosity, Fluids, USSR.

AD-288 712 Div. 26
(TISTM/ODN) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
SORPTION-CONDENSATION-IONIC ULTRAHIGH-VACUUM PUMP,
by Ye. N. Martinson, K. N. Myznikov and others. 25 May 62, 4p. (Trans. no. FTD-TT-62-526 from Patent No. 140123, Sorbtionno-Kondensationno-Ionnyy Sverkhvysokovakuumnyy Nasos, pp. 1-2, 1961)
Unclassified report

DESCRIPTORS: *Vacuum pumps, *Inventions, Gas ionization, Titanium, Zirconium, Thorium, Condensate pumps, Liquefied gases, Nitrogen, Adsorption.

AD-288 715 Div. 26
(TISTW/RD) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
WHAT THEN IS DEPENDABILITY,
by Ya. Sorin. 13 June 62, 6p. (Trans. no. FTD-TT-62-830 from Pravda, pp. 2, 11 Jan 62)
Unclassified report

DESCRIPTORS: *Reliability, USSR, Industrial equipment.

AD-288 716 Div. 26, 7
(TISTM/EJH) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
NEWS OF INSTITUTES OF HIGHER LEARNING, INSTRUMENT MANUFACTURE (SELECTED ARTICLES).
20 June 62, 23p. (Trans. no. FTD-TT-62-325 from Izvestiya Vysshikh Uchebnykh Zavedeniy, Priborostroyeniye, vol. 4, No. 2, pp. 52-66, 1961)
Unclassified report

DESCRIPTORS: *Pneumatic devices, *Servo systems, Instrumentation, Production, Operation, Mathematical analysis, Errors, Circuits, Potentiometers, USSR.

AD-288 760 Div. 26, 27
(TISTM/EJH) OTS price $1.10

Rolla Metallurgy Research Center, Bureau of Mines, Mo.
VAPOR DEPOSITION OF TUNGSTEN AND THE EFFECTS OF PROCESS VARIABLES.
Monthly progress rept. no. 8 for June 62,
by F. W. Hoertel. June 62, 3p. (Rept. no. IPR SP-6-62-4)
Unclassified report

DESCRIPTORS: *Tungsten, *Vapor plating, *Metallic smoke deposits, *Rocket motor nozzles, *Refractory coatings, Surfaces, Bonding, Metal coatings, Metals, Ceramic materials.

Division 26 - PRODUCTION AND MANAGEMENT

AD-288 765 Div. 26, 14
(TISTM/ODN) OTS price $8.10

Reed Research, Inc., Washington, D. C.
DESIGN CONCEPTS FOR MISSILE SHIPPING CONTAINERS,
by G. S. Mustin and E. D. Hoyt. 1958, 79p.
Unclassified report

DESCRIPTORS: *Containers, *Shipping, *Guided missiles, Theory, Mathematical analysis, Design.

AD-288 766 Div. 26
(TISTM/EJH) OTS price $1.10

General Bronze Corp., Garden City, N. Y.
(No title).
Progress rept.
30 June 62, 8p.
(Contract NObsr-85320)
Unclassified report

DESCRIPTORS: *Welding, *Welds, *Welded joints, Sheets, Electron guns, Electron beams.

AD-288 777 Div. 26
(TISTM/ODN) OTS price $1.10

Vermont U., Burlington.
THE DEVELOPMENT OF A LABORATORY SCALE FILAMENT WINDING SYSTEM TO PRODUCE PRESSURE VESSELS, RAPIDLY AND SIMPLY,
by John O. Outwater. 26 July 62, 7p. (Technical memo. no. 192)
(Contract Nonr-321901, Proj. no. 62 R05 19A)
Unclassified report

DESCRIPTORS: *Pressure vessels, *Filament-wound construction, *Production, Manufacturing methods.

AD-288 778 Div. 26, 17
(TISTM/TCG) OTS price $1.10

McDonnell Aircraft Corp., St. Louis, Mo.
MOLYBDENUM STRUCTURAL COMPONENT PROGRAM.
Progress rept. for 1 May-1 Aug 62.
1 Aug 62, 3p.
(Contract NOw 61-0653)
Unclassified report

DESCRIPTORS: *Molybdenum, *Sheets, *Manufacturing methods, Quality control, Surfaces, Machining, Grinders, Forging, Processing.

AD-288 795 Div. 26
(TISTM/EJH) OTS price $2.60

Pitman-Dunn Labs. Group, Frankford Arsenal, Philadelphia, Pa.
AN ANALYSIS OF THE UNDERCUT PROBLEM IN INVOLUTE SPUR GEARING,
by Robert A. Shaffer. May 62, 22p. (Technical rept. no. R-1606)
(DA Proj. no. 505-01-003)
Unclassified report

DESCRIPTORS: *Gears, Applied mechanics, Design, Mathematical analysis.

AD-288 800 Div. 26, 14, 17
(TISTM/BRW) OTS price $10.10

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
A GENERAL STUDY OF PROCESSES FOR THE REALIZATION OF DESIGN CONFIGURATIONS IN MATERIALS.
Interim technical rept. no. 3, 3 Apr-3 Nov 62, on Proj. NEOS,
by Paul Rosenthal. Nov 62, 123p. incl. illus. tables, 60 refs. (Rept. no. NM-1559-P-3)
(Contract AF 33(600)42921, Proj. NR 7-867)
(ASD IR-3) Unclassified report

DESCRIPTORS: *Materials, *Metals, *Crystals, Electric fields, Magnetic fields, Ion bombardment, Electron bombardment, Lasers, Shock waves, Manufacturing methods, Welding, Metals, Ceramic materials, Refractory materials, Deformation, Energy, Processing, Machining.

Studies were continued within the framework of process elements previously established. Highlights are (1) the concept of embrittlement machining based on one or more of several material embrittlement mechanisms and (2) recommendations for experimental investigation of surface hardening, oxidation retardation, and embrittlement of materials by ion bombardment. The role of electric and magnetic fields as primary and as auxiliary energy sources is explored. Electron, ion, and laser beams are compared, and their potential roles in material removal and material addition process are discussed. The embrittlement mechanisms are evaluated systematically as part of the search for material modifications that can enhance material removal, addition, and displacement operations. The effect of strain rate and temperature on material properties is investigated as part of the consideration of environmental effects in manufacturing processes. Dislocation behavior associated with strain is discussed. (Author)

AD-288 839 Div. 26, 30
(TISTB/AW) OTS price $1.60

System Development Corp., Santa Monica, Calif.
THE EXPERIMENTAL STUDY OF LARGE-SCALE ORGANIZATIONAL STRUCTURES,
by Beatrice K. Rome and Sydney C. Rome.
4 Oct 62, 11p. incl. illus. 1 ref. (Rept. no. SP-983)
Unclassified report

DESCRIPTORS: *Management engineering, *Group dynamics, *Command systems, Decision making, Information theory, Automation, Simulation, Computers.

Leviathan, the study of the structure and dynamics of large social groups, is described. This study has been concentrating on command systems that (1) produce a product or provide a service, (2) distribute responsibility and executive control over middle-level officers or managers, and (3) exhibit highly developed top-level policy making command functions. Seven elements are used to obtain empirically testable results. The productive system programs which operate on the Philco 2000 computer are described. A future series of experiments to be conducted in System Development Corporation's Systems Simulation Research Laboratory (SSRL) is outlined. (Author)

AD-288 840 Div. 26
(TISTB/MS) OTS price $1.60

System Development Corp., Santa Monica, Calif.
SYSTEM SIMULATION FOR EVALUATING PRODUCT QUALITY,
by James R. Crawford. 12 Oct 62, 19p. (Rept. no. SP-992)
Unclassified report

DESCRIPTORS: *Management engineering, *Data processing systems, *Documentation, *Data transmission systems, *Quality control, Sequences, Probability, Job analysis, Simulation.

The conceptual framework for simulating any large system is described in terms of a queue task network through which transactions flow. The concept of simulating motion in such a

system is discussed. The portions of a whole system associated with product quality are considered as an operating sub-system, including generating functions for incoming product quality and the defectives produced by production. Sampling plans operate in this system. How the simulated system provides records for evaluating the product quality presented to the stockroom or to the customer is explained. (Author)

AD-288 892 Div. 26
(TISTM/BRW) OTS price $2.00

Southwest Research Inst., San Antonio, Tex.
RESEARCH ON HIGH-TEMPERATURE BEARINGS.
Rept. for 10 Mar 60-Mar 62 on Bearings and Mountings for Advanced Systems,
by R. D. Brown, R. A. Burton, and P. M. Ku.
Aug 62, 71p. incl. illus. tables, 15 refs.
(Contract AF 33(616)7209, Projs. 1315 and 3044)
(ASD TR 61-705) Unclassified report

DESCRIPTORS: *Bearings, *Journal bearings, High temperature research, Materials, Cermets, Molybdenum alloys, Titanium alloys, Niobium alloys, Nickel alloys, Chromium alloys, Cobalt alloys, Aluminum alloys, Lubricants, Metal films, Molybdenum compounds, Alloys, Silver alloys, Palladium alloys, Tests, Sulfides.

This report describes the evaluation work performed on oscillating bearings of both plain journal and self-aligning types. The bearing substrate materials included cermets LT-1B and LT-2 and alloys F-48 and Rene 41. Lubricants receiving extensive evaluation were a clad silver-palladium alloy, molybdenum disulfide used in cavities, and bonded molybdenum disulfide. Results include those from friction and wear evaluations, radial load capacity tests on plain journal bearings, and axial and radial load capacity tests on self-aligning bearings. The bearing specimens had a nominal diameter of 1/2 inch. The friction and wear tests were made at an oscillating frequency of 31 cpm, at temperatures generally ranging from -90 to 1750 F, and at pressures generally ranging from 10 to the -6th power to 10 to the -5th power mm Hg. The projected bearing load was in the range of 4,400 to 12,000 psi. (Author)

AD-288 933 Div. 26, 15
(TISTB/AW) OTS price $8.10

Numerical Analysis Research, U. of Calif., Los Angeles.
TANDEM QUEUES WITH DYNAMIC PRIORITIES,
by Andrew A. Grindlay. 10 Sep 62, 82p. incl. illus. tables, 19 refs. (Western Management Science Instit. working paper no. 14; Management Science Research Proj. research rept. no. 78)
(Contracts Nonr-23373 and Nonr-23375)
Unclassified report

DESCRIPTORS: *Management engineering, *Probability, *Industrial production, Decision making, Statistical distributions, Operations research.

The behavior of series of queues in tandem, where priority of service is governed by due-date-like ''dynamic priorities'', is studied. The main results concern the asymptotic behavior of the equilibrium waiting-time distributions. The sequencing of work in a production facility is one of the most important functions of production control. Done well, sequencing can contribute immeasurably to the profitability of an enterprise; done poorly, it can cause tardiness, dissatisfied customers and inefficient use of men and machines. The research reported on here was undertaken to provide information useful for improving sequencing techniques. While the systems being studied are thought of in a manufacturing context, they relate also to service facilities not generally considered to be manufacturing systems. (Author)

AD-289 065 Div. 26, 17
(TISTM/BRW) OTS price $6.60

Universal-Cyclops Steel Corp., Bridgeville, Pa.
TUNGSTEN SHEET ROLLING PROGRAM.
Interim technical progress rept. no. 5 and final on Phase 3, 19 Apr-1 Sep 62,
by W. J. Schoenfeld. Nov 62, 54p. incl. illus. tables.
(Contract AF 33(600)41917, Proj. 7-827)
(ASC TR 7-827, vol. 5)Unclassified report

DESCRIPTORS: *Tungsten, *Rolling mills, *Sheets, Forging, Extrusion, Heat treatment, Transition temperature, Crystallization, Thickness, Hardness, Microstructure, Grains (Metallurgy), Tensile properties, Mechanical properties, Processing.

Rolling and evaluation of the Phase III material has been completed. The effect of various processing parameters on work-ability and final properties is documented. Significant conclusions are: (1) extrusion to rounds or to rectangular cross-section sheet bar can be accomplished equally well, (2) initial rolling of extruded or extruded and forged product can be and is best accomplished in the temperature range of 2300 F, (3) in order to achieve the lowest ductile-brittle transition, final rolling temperatures should not exceed 1550 F, and (4) cross rolling improves both the longitudinal and the transverse bend and tensile properties. (Author)

AD-289 265 Div. 26, 17
(TISTM/BRW) OTS price $3.60

General Electric Co., West Lynn, Mass.
HYDRODYNAMIC COMPRESSIVE FORGING.
Interim technical engineering rept., 9 July-9 Oct 62,
by Richard M. Cogan and Frederick S. Dorman.
9 Oct 62, 33p. incl. illus.
(Contract AF 33(657)8793, Proj. 7-890)
(ASD TR 7-890, vol. 1) Unclassified report

DESCRIPTORS: *Metals, *Forging, Hydrostatic pressure, Hydraulic presses, Forge presses, Dies, High pressure research, Manufacturing methods, Steel, Alloys, Heat-resistant alloys, Materials.

Hydrostatic environment increases the effective ductility of materials. Dies can be built to retain 750,000 psi by the use of prestressed cylinders. The application of high hydrostatic pressures to current manufacturing processes represents a new and important field for investigation. (Author)

AD-289 366 Div. 26, 17
(TISTM/BRW) OTS price $2.25

Aerojet-General Corp., Sacramento, Calif.
DIFFUSION BONDING OF TUNGSTEN ALLOYS.
Final rept. 1 Aug 61-31 July 62,
by G. K. Hockox. 15 Nov 62, 91p. incl. illus. tables, 11 refs. (Rept. no. 0433-01F)
(Contract DA 04-200-ORD-1077)
(AL TR 465.54/4) Unclassified report

DESCRIPTORS: *Tungsten alloys, Bonding, Diffusion, Rocket motor nozzles, Preparation, Metal joints, Soldering alloys, Bonded joints, Melting, Alloys, Brazing.

The joining of W for high-temperature service by a low-temperature diffusion-bonding or diffusion-brazing process was demonstrated. Test joints that withstood temperatures in excess of 5000 F in remelt tests and a diffusion-brazed nozzle that withstood a motor firing under severe conditions showed that sound joints between W sheets can be made for these high-temperature-

service conditions. Although the high-temperature properties of diffusion-bonded W joints are very desirable, the ambient-temperature properties of the W material still limit the use of this metal. Recrystallization of the W during the joining process is detrimental and must be avoided. Braze alloys with lower melting points must be developed for this type of joining process to ensure that no extensive recrystallization occurs. (Author)

AD-289 537 Div. 26, 7, 17
(TISTM/ODN) OTS price $11.00

Fairchild Semiconductor Div., Fairchild Camera and Instrument Corp., Mountain View, Calif.
PRODUCTION ENGINEERING MEASURE 2N914 AND 2N995.
Quarterly rept. no. 1, 30 Apr-30 July 62,
by D. M. Kobrin. 30 July 62, 1v. incl. illus. tables.
(Contract DA 36-039-sc-86726)
Unclassified report

DESCRIPTORS: *Bonding, *Semiconductors, *Wire, Gold wire, Aluminum wire, Palladium, Dies, Phase studies, Alloys, Palladium alloys, Gold alloys, Platinum alloys, Silicon alloys, Brass, Capillary tubes, Silicon, Stresses, Growth, Ultrasonics, Particles.

This report presents a detailed narrative of work accomplished in May, June and July of 1962, and the latest network diagram reflecting plans for the completion of each task. Data, sketches, and reports are appended to the discussion of each task. The following topics are treated: lead attachments, small ball bonding, wire study, ultrasonic bonding, dynamic and step stress testing, preparation of substrate for epitaxial growth, header plating, elimination of gross particles, and die attachment. (Author)

27. PROPULSION SYSTEMS

AD-288 044 Div. 27, 17
(TISTM/TCG) OTS price $1.60

Naval Boiler and Turbine Lab., Philadelphia, Pa.
INVESTIGATION OF THE RELATIONSHIP BETWEEN BOILER WATER CHEMISTRY AND TURBINE BLADE PITTING.
Final rept.
6 Nov 62, 10p. (Proj. no. A-348)
Unclassified report

DESCRIPTORS: *Boilers, *Boiler compounds, *Turbine blades, *Corrosion, Water, Condensation, Chemical reactions, Conductivity, Steam, Chemical analysis, Sodium compounds, Chlorides, Corrosive liquids, Phosphates, Hydrogen ion concentration, Moisture.

Tests were conducted on the DDG-15 and LPH-2 boilers as well as on plant boilers to obtain data on the solids concentrations in the steam condensate. Analyses were conducted only during 'end-point' moisture carryover evaluations on the boilers when they were steamed at overload and high water levels with high boiler water dissolved solids permitting temporary carryover. Results showed that the Na concentration in the steam at the superheater inlet was higher than at the outlet suggesting that soluble salts remain in the superheater. Test results indicated that: (a) there is no preferential carryover of NaCl with the steam; (b) no carryover from alkalinity would result in boilers receiving the proper boiler water treatment; (c) carryover should not be a problem on boilers at normal water levels with normal boiler water dissolved solids even at overload steaming conditions; and (d) no preferential carryover of salts normally found in 600 and 1200 psi boilers should occur. (Author)

AD-288 176 Div. 27, 1
(TISTA/GEC) OTS price $1.10

Naval Air Test Center, Patuxent River, Md.
INVESTIGATION OF MAIN FUEL SHUTOFF VALVE FOR F3H AIRCRAFT.
Rept. no. 1 (Final),
by J. C. Tibbs. 22 May 62, 3p. (Problem Assignment no. RAP3221/72; Rept. no. ST32-227)
Unclassified report

DESCRIPTORS: *Fuel systems, Jet fighters, Flight testing, Naval aircraft, Cut-off valves.

AD-288 449 Div. 27
(TISTA/GEC) OTS price $1.10

Aerospace Information Div., Washington, D. C.
SOVIET PROGRESS IN THE DEVELOPMENT OF FREE-PISTON GAS GENERATORS.
30 July 62, 3p. (AID rept. no. 62-109; Trans. from Mashinostroyeniye, no. 1, pp. 7-13, 95-104, 1962)
Unclassified report

DESCRIPTORS: *Gas generating systems, *Gas generator engines, Pistons, Design, Compressors, Scientific research, USSR, Pneumatic systems.

AD-288 634 Div. 27, 14
(TISTM/ODN) OTS price $2.60

Rocketdyne, Canoga Park, Calif.
DEVELOPMENT OF LIGHTWEIGHT, SEGMENTED ROCKET MOTOR CASES EMPLOYING FIBERGLASS.
Quarterly documentary rept. no. 2, 1 July-30 Sep 62, 28 Oct 62, 17p. incl. illus. (Rept. no. R-3703-2)
(Contract AF 04(611)8185, Proj. 3059)
Unclassified report

DESCRIPTORS: *Rocket cases, *Glass textiles, Reinforcing materials, Manufacturing methods, Laminates, Steel, Metals, Steel wire, Joints, Tests, Theory, Design.

This report transmits technical information dealing with the development of lightweight, segmented motor cases. Analysis of strength has been continued to include problems of strain compatibility and transition of strain from the all-metal zone to the all-fiberglass zone. Minor design changes are reported. A simple process for fabricating the metal laminae required in the joint construction is described. (Author)

AD-288 644 Div. 27
(TISTW/PCR) OTS price $1.60

Army Armor Board, Fort Knox, Ky.
EVALUATION OF LVDS 1100 AFTER-COOLED ENGINE.
19 Nov 62, 7p. illus. (Proj. no. 2205)
Unclassified report

DESCRIPTORS: *Tank engines, *Internal combustion engines, Cooling, Desert tests, Acceleration, Fuel consumption, Maintenance, Tests, Tanks.

The suitability of the LVDS 1100 after-cooled engine for use in future combat vehicles under desert conditions was determined. The US Army Armor Board concludes that, with regard to performance and maintainability, the LVDS 1100 after-cooled engine will be suitable for use under desert conditions in future combat vehicles of approximately 38-1/2 tons weight after production engineering is accomplished. (Author)

AD-288 721 Div. 27
(TISTP/JW) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE DETERMINATION OF THE OPTIMUM VALUE OF THE UPPER OVERLAPPING OF A BANDAGED TURBINE STAGE, by M. Ye. Deych and A. G. Sheynkman. 11 June 62, 13p. (Trans. no. FTD-TT-62-736 from Teploenergetika, No. 1, pp. 28-31, 1962)
Unclassified report

DESCRIPTORS: *Turbines, *Staging, Effectiveness, Translations, Seals, USSR.

AD-288 897 Div. 27
(TISTA/SEB) OTS price $8.60

Purdue U., Lafayette, Ind.
THE INFLUENCE OF DUAL INJECTION SLOTS ON THE FILM COOLING OF ROCKET MOTOR COMBUSTION CHAMBERS.
Master's thesis,
by Gerald Ray Guinn. Jan 63, 84p. incl. illus. tables, 18 refs.
(Contract Nonr-110021)
Unclassified report

DESCRIPTORS: *Rocket motors, *Film cooling, *Theses, Gaseous rocket propellants, Air, Hydrogen, Coolants, Water, Ethanols, Liquids, Heat transfer, Effectiveness, Pressure, Temperature, Test methods, Test equipment, Tests, Mathematical analysis, Combustion chambers, Liquid cooled, Injection, Orifices, Cooling.

A cylindrical chamber rocket motor employing gaseous hydrogen and air as propellants was utilized to determine the film cooling requirements when the film coolant is injected through two circumferential slots at different axial locations. The motor was operated at three different Reynolds numbers and at one nominal chamber pressure and combustion gas temperature. The length of the upstream film cooled section remained constant at 4 in. while the downstream film cooled section was varied from 8 in. to 4 in. Water and ethyl alcohol were utilized as the film cooling agents. A simplified analysis was developed which adequately represented the experimental results over the range of parameters investigated. Experimental results showed that the film cooling requirements for a section of combustion chamber were reduced by as much as 65% when it was downstream of another liquid film cooled section. An increase in film coolant flow rate for a downstream film cooled section would result in a proportionally larger increase in film cooled length than would occur for the same increase in coolant flow for a single film. (Author)

AD-289 026 Div. 27
(TISTA/SEB) OTS price $1.10

Aerospace Information Div., Washington, D. C.
SOVIET DESIGNING OF AIRCRAFT GAS TURBINES.
2 Nov 62, 2p. (AID rept. 62-181; Trans. from Simultaneous Vibrations in Gas-Turbine Engines (Sovmestnyye Kolebaniya v Gazoturbinnykh Dvigatelyakh) Moskva, Oborongiz, 142p., 1962)
Unclassified report

DESCRIPTORS: *Gas turbines, Jet engines, Stresses, Translations, USSR, Resonance, Vibration.

AD-289 267 Div. 27, 14, 17
(TISTM/EJH) OTS price $2.60

Little, Arthur D., Inc., Cambridge, Mass.
DEVELOPMENT OF PYROLYTIC REFRACTORY MATERIALS FOR SOLID-FUEL ROCKET MOTOR APPLICATIONS.
Quarterly status rept. no. 3,
by Ronald Francis. 10 Apr 62, 34p. incl. illus. tables, 4 refs. (Rept. no. C-63938)
(Contract DA 19-020-ORD-5490, Proj. 5B93-32-004)
(WAL TR 766.41/2-2) Unclassified report

DESCRIPTORS: *Rocket motors, *Rocket motor nozzles, *Refractory materials, *Refractory contings, *Thermal insulation, Graphite, Carbon, Deposits, Vapor plating, Manufacturing methods, Crystal structure, Tungsten alloys, Boron alloys, Zirconium alloys, Silicon alloys, Boron compounds, Nitrides, Oxidation, Density.

Preparation of pyrolytic graphite under a variety of conditions and with a variety of hydrocarbon sources is described. Deposition rates increased with source molecular weight although benzene gave an abnormally low value. Virtually independent of source, densities below 1.50 gm/cc at 1700 C rising to approximately theoretical at 2000 C were found. Increase in degree of preferred orientation and crystallite size with deposition temperature attendant with interlattice spacing approaching the values of single crystal graphite is described. Layer ordering increased with heat treatment. Increased carbon flow rates decreased metal concentration in alloying experiments. The effect of deposition temperature appeared to be minor with low vapor pressure. The preparation of well-bonded pyrolytical coatings on rocket motor test nozzle inserts is described. A pyrolytic boron nitride coating suitable for testing was obtained only with low deposition rate at 1600-1800 C on an AGSR substrate. (Author)

AD-289 363 Div. 27, 26
(TISTM/BRW) OTS price $1.50

General Electric Co., Cincinnati, Ohio.
DEVELOPMENT OF ROLL-FORMED TUNGSTEN NOZZLE COMPONENTS.
Final rept.,
by J. P. Vanden Noort. 31 Aug 62, 44p. incl. illus.
(Contract Now 61-0161-c)
Unclassified report

DESCRIPTORS: *Rocket motor nozzles, *Tungsten, Sheets, Conical bodies, Lathes, Manufacturing methods, Tests, Production, Processing.

The shear forming and spinning of commercially available tungsten sheet into nozzle parts of various configurations was demonstrated. The design configurations included convergent/divergent throat sections, bent-back and minimum radius flanges, and uniform wall thickness over the length and contour of the part. A total of ten parts were delivered; three exit cone liners, four throat inserts of one design, and three throat inserts of an improved configuration.The nozzle parts were fitted and bonded to grapite substrates and were designed to be includedas components of nozzle assemblies. Two such units were fired. The work demonstrates that such parts can be produced in quantity with a high degree of control over quality and reliability. (Author)

28. PSYCHOLOGY AND HUMAN ENGINEERING

AD-288 054 Div. 28
(TISTB/MS) OTS price $1.60

Israel Inst. of Applied Social Research, Jerusalem.
FACET DESIGN AND ANALYSIS OF DATA ON PERSONALITY AND ATTITUDES RELATED TO HUMAN ORGANIZATION. Final technical rept.,
by Uriel G. Foa and Louis Guttman. Mar 62, 16p. incl. table, 11 refs.
(Contract AF 61(052)121)
Unclassified report

DESCRIPTORS: *Personality, *Attitudes, *Behavior, *Statistical analysis, *Probability, Theory, Job analysis, Classification, Group dynamics, Management engineering, Employee relations.

AD-288 151 Div. 28
(TISTB/SAT) OTS price $2.60

Human Engineering Lab., Aberdeen Proving Ground, Md.
THE TANK USER,
by John W. Lewis and Paul M. Maffia. Feb 62, 22p. (Technical note no. 2-62)
Unclassified report

DESCRIPTORS: *Human engineering, Tanks, Selection, Military requirements, Military personnel.

AD-288 168 Div. 28
(TISTB/SAT) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INCREASING THE RADIORESISTIVITY OF NERVE TISSUE WITH THE AID OF THIAMINE PREPARATIONS COMBINED WITH NARCOTICS,
by P. F. Minayev, P. Moshchinskiy, and Ye. P. Skorobogatova. 12 June 62, 8p. (Trans. no. FTD-TT-62-831 from Doklady Akademii Nauk, Vol. 143, No. 4, pp. 976-979, 1962)
Unclassified report

DESCRIPTORS: *Psychology, Perception, Behavior, Detection, Physics.

AD-288 257 Div. 28
(TISTB/MS) OTS price $7.60

Princeton U., N. J.
THE MEASUREMENT OF FOUR SYSTEMS OF PERSONALITY STRUCTURE VARYING IN LEVEL OF ABSTRACTNESS. (SENTENCE COMPLETION METHOD),
by H. M. Schroder and Siegfried Streufert. 1962, 28p. incl. illus. tables (Technical rept. no. 11)
(Contract Nonr-185 812, Proj. 171-055)
Unclassified report

DESCRIPTORS: *Personality, *Personality tests, Theory, Test methods, Measurement, Reliability.

Four systems of personality structure varying in degree of abstractness are briefly described in the framework of self theory. A manual for inferring system properties from sentence completion is presented. This test can be scored reliably after considerable knowledge of the theoretical principles involved. Several tests (including the F scale, dogmatism, rigidity, machiavellianism) are included and in general the results are consistent with the theoretical assumptions. Other tests such as intelligence, verbal fluidity and social desirability were also included. These studies show that when personality is viewed in these terms a systematic relationship exists between personality structure and social interaction. This method of measuring personality structure is still relatively subjective and time consuming and difficult, but it is the most effective at this time. (Author)

AD-288 405 Div. 28
(TISTB/SAT) OTS price $1.10

Virginia U., Charlottesville.
EXPERIMENTS IN VERBAL BEHAVIOR. II. THE REINFORCEMENT OF LINGUISTIC STRUCTURES USING AN ELECTRONIC VOICE OPERATED RELAY. II. PRELIMINARY RESULTS,
by Arthur J. Bachrach and William T. Ross, Jr. June 62, 5p.
(Contract Nonr-47408)
Unclassified report

DESCRIPTORS: *Conditioned reflex, *Psychotherapy, *Speech, Reaction, Lie detectors.

AD-288 406 Div. 28
(TISTB/CCH) OTS price $2.60

Institute of Science and Tech., U. of Michigan, Ann Arbor.
SEEKING INFORMATION TO REDUCE THE RISK OF DECISIONS,
by Ward Edwards and Paul Slovic. Aug 62, 22p. (Rept. no. 2900-342-S)
(Contract DA 36-039-sc-78801, Proj. MICHIGAN)
Unclassified report

A speech delivered at a meeting of the Midwestern Psychological Association, Chicago, Illinois, 4 May 1962.

DESCRIPTORS: *Decision making, *Games theory.

AD-288 414 Div. 28
(TISTB/SAT) OTS price $1.10

Civil Aeromedical Research Inst., Oklahoma City, Okla.
TACTILE COMMUNICATION,
by Glenn R. Hawkes. May 62, 7p. (Rept. no. 62-11)
Unclassified report

DESCRIPTORS: *Tactual perception, Signals, Aircraft, Communication systems.

AD-288 417 Div. 28
(TISTB/SAT) OTS price $1.10

Virginia U., Charlottesville.
A SCHEMA OF RESPONSE PROBABILITY AS A FUNCTION OF STIMULUS EVENTS,
by Donald M. Thompson and Milton L. Goff. July 62, 5p.
(Contract Nonr-47408)
Unclassified report

DESCRIPTORS: *Probability, *Behavior, Conditioned reflex.

AD-288 426 Div. 28
(TISTB/SAT) OTS price $1.10

Harvard U. Graduate School of Education, Cambridge, Mass.
THE SELF CONCEPT IN CAREER DEVELOPMENT: A CONSTRUCT IN TRANSITION,
by Frank L. Field, Chris D. Kehas, and David V. Tiedeman. 20 Mar 62, 7p. (Harvard Studies in Career Development no. 24; Technical rept. no. 21)
(Contract Nonr-186631)
Unclassified report

DESCRIPTORS: *Vocational tests, *Behavior, Probability.

AD-288 427 Div. 28
(TISTB/SAT) OTS price $1.60

Harvard U. Graduate School of Education, Cambridge, Mass.
AWARENESS OF INTEREST IN BOYS IN GRADES SEVEN AND EIGHT,
by Robert P. O'Hara and David V. Tiedeman. 8 Jan 62, 14p. (Harvard Studies in Career Development no. 17; Technical rept. no. 14)
(Contract Nonr-186631)
Unclassified report

DESCRIPTORS: *Achievement tests, *Aptitude tests, Intelligibility, Students.

AD-288 439 Div. 28
(TISTB/SAT) OTS price $1.10

Walter Reed Army Medical Center, Washington, D. C.
ANNUAL PROGRESS REPORT.
Rept. for 1 July 61-30 June 62,
by Carl G. Lauterbach and William Vogel. 30 June 62, 6p. (Rept. no. CSCRD-16)
(Proj. no. 6-60-01-002)
Unclassified report

DESCRIPTORS: *Psychotherapy, Personality, Behavior, Military personnel.

AD-288 447 Div. 28
(TISTB/SAT) OTS price $7.60

Rutgers U., New Brunswick, N. J.
HOMEOSTASIS THEORY OF SMALL GROUPS VII: LONGITUDINAL STUDIES,
by F. K. Berrien. June 62, 73p. (Technical rept. no. 10)
(Contract Nonr-40410)
Unclassified report

DESCRIPTORS: *Applied psychology, Stability, Reaction, Emotions.

AD-288 452 Div. 28
(TISTB/SAT) OTS price $2.60

Air Crew Equipment Lab., Naval Air Material Center, Philadelphia, Pa.
HUMAN ENGINEERING INVESTIGATIONS OF AIRCRAFT COCKPIT VISUAL DISPLAYS. INVESTIGATIONS INTO FACTORS AFFECTING CONTROL ACTIVATION. IV. THE EFFECTS OF TIME STRESS ON CONTROL ACTIVATION RATE AND ERRORS,
by Richard S. Lanterman, Arthur I. Siegel, and Douglas G. Schultz. 11 June 62, 19p. (Rept. no. NAMC-ACEL-483; Proj. no. TED NAM AV-43001, pt. 5)
(Contract N156-40376)
Unclassified report

DESCRIPTORS: *Psychometrics, Reaction time, Stresses.

AD-288 453 Div. 28
(TISTB/SAT) OTS price $8.10

Oxford U. (Gt. Brit.).
MAZE LEARNING AND BRAIN LESIONS IN ANTS,
by D. M. Vowles. 21 Sep 61, 53p. (Technical note no. 3)
(Contracts AF 61(052)114 and AF 61(052)420)
Unclassified report

DESCRIPTORS: *Perception, Learning, Neurology, Ants.

AD-288 454 Div. 28
(TISTB/SAT) OTS price $3.60

Oxford U. (Gt. Brit.).
MAZE LEARNING AND DISCRIMINATION IN ANTS,
by D. M. Vowles. 30 May 61, 37p. (Technical note no. 1)
(Contracts AF 61(052)114 and AF 61(052)420)
Unclassified report

DESCRIPTORS: *Learning, Neurology, Ants.

AD-288 513 Div. 28, 12
(TISTB/CCH) OTS price $3.50

Hughes Aircraft Co., Culver City, Calif.
HUMAN ENGINEERING CRITERIA FOR MANNED SPACE FLIGHT. MINIMUM MANUAL SYSTEMS.
Rept. for Apr 61-Apr 62 on Human Performance in Advanced Systems,
by Donald K. Bauerschmidt and Robert O. Besco. Aug 62, 227p. incl. illus. tables, 42 refs.
(Contract AF 33(616)8168, Proj. 7184)
(AMRL TDR 62-87) Unclassified report

DESCRIPTORS: *Human engineering, *Spaceships, *Control systems, *Guidance, Control simulators, Mathematical analysis, Space flight, Manned.

Analytical and experimental investigations were made of simple or minimum manual guidance and control systems. A complete three-degree of freedom static simulator was used to study the manual attitude control of space vehicles. Major controller, display and vehicle configuration parameters were compared experimentally. The system kinematics, manual control and visual factors of space rendezvous and docking maneuvers were analyzed. Procedures for manual participation in space navigation and guidance were studied and a preliminary design of a simple computational aid was developed. The conclusions of all the studies are presented and recommendations are made for the design of manual guidance and control systems. (Author)

Division 28 - PSYCHOLOGY AND HUMAN ENGINEERING

AD-288 530 Div. 28, 1
(TISTA/GEC) OTS price $2.60

Applied Psychological Services, Wayne, Pa.
INVESTIGATIONS INTO FACTORS AFFECTING CONTROL ACTIVATION. VI. SUPPLEMENTAL STUDY OF TOGGLE SWITCH NUMBER AND DENSITY.
Report on Human Engineering Investigations of Aircraft Cockpit Visual Displays,
by Richard S. Lanterman, Douglas G. Schultz and others. 28 Sep 62, 14p. incl. illus. tables, 5 refs. (Rept. no. NAMC-ACEL-488)
(Contract N156-40376)
Unclassified report

DESCRIPTORS: *Toggle switches, *Human engineering, Control, Cockpits, Reaction time, Mathematical analysis, Control panels, Effectiveness, Display systems.

A study is described of the effects of varying the number and density of toggle switches on control activation time. The range of each of these factors was extended beyond that used in an earlier study in order to explore reasonable limits. It was found again that the time required to activate a series of toggle switches varied directly and linearly with the number of switches involved. With a small number of controls, the relationship between activation time and control density was found to be roughly linear, but, as the number of controls increased and the between switch distance became large, a negatively accelerated curvilinear relationship became more apparent. (Author)

AD-288 584 Div. 28, 30
(TISTB/MS) OTS price $1.60

System Development Corp., Santa Monica, Calif.
SIMULATING ELEMENTARY SOCIAL BEHAVIOR,
by John T. Gullahorn and Jeanne E. Gullahorn. 1 Oct 62, 16p. incl. illus. 6 refs. (Rept. no. SP-938/000/00)
Unclassified report

Paper presented at a symposium on Applications of Computer Simulation in Social Psychology at the meetings of the American Psychological Association on Aug 1962, St. Louis, Missouri.

DESCRIPTORS: *Behavior, *Computers, *Data processing systems, *Decision making, *Social communication, Information theory, Communications theory, Simulation, Programming.

The author's work in developing a computer model (HOMUNCULUS) is based on George Homans' publication, Social Behavior: Its Elementary Forms. HOMUNCULUS is an attempt to explicate, in a way not possible with verbal theory, the ability of a person in normal social interaction to evaluate the context of behavior, retrieve information necessary to alternative plans of action, and select the conditions under which he will undertake one activity rather than another. (Author)

AD-288 687 Div. 28
(TISTB/AW) OTS price $3.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
MILITARY SMALL GROUP PERFORMANCE UNDER ISOLATION AND STRESS - CRITICAL REVIEW. I. INFORMAL, NATURAL GROUPS: DEVELOPMENT, STRUCTURE, AND FUNCTION,
by S. B. Sells. June 62, 30p. 11 refs. (Rept. no. AAL TDR 62-31)
(Proj. 8243-11; In cooperation with Texas Christian U., Fort Worth, Contract AF 41(657)323)
Unclassified report

DESCRIPTORS: *Military psychology, *Group dynamics, Attitudes, Design, Military operations, Leadership, Needs, Alaska, Stress (Psychology).

The principles of group development, formation of group structure, and functioning of informal, natural groups as a background and context for the study of the behavior of formal organizations are reviewed. It is the first of five literature reviews of scientific investigations of group behavior, isolation, and stress, focused on the problems of organization, management, supervision, and human relations at AC&W sites in the Alaskan Air Command. Emphasis is placed here on the basic processes of group formation, development of group structure, social power (and leadership), communication of information, and group norms as regulators of behavior. Implications for military commanders are discussed from the view-point that the military commander, at every level, is an appointed leader who must exploit principles of human behavior effectively in order fully to realize his role and accomplish his mission. (Author)

AD-288 688 Div. 28
(TISTB/AW) OTS price $4.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
MILITARY SMALL GROUP PERFORMANCE UNDER ISOLATION AND STRESS - CRITICAL REVIEW. II. DIMENSIONS OF GROUP BEHAVIOR,
by S. B. Sells. June 62, 42p. incl. table, 21 refs. (Rept. no. AAL TDR 62-32)
(Proj. 8243-11; In cooperation with Texas Christian U., Fort Worth, Contract AF 41(657)323)
Unclassified report

DESCRIPTORS: *Military psychology, *Group dynamics, Military operations, Design, Factor analysis, Control, Management engineering, Alaska, Stress (Psychology).

The second of five reviews of psychological and sociological literature bearing on group behavior problems of AC&W sites in Alaska is presented. Fourteen basic dimensions of groups, described by Hemphill, are discussed in terms of their effects on group behavior, with particular reference to AC&W site problems. The results of a factor a analysis, based on 100 civilian organizations, which arrays the 14 dimensions according to three factors - behavior regulation appearing as social structure, effective group effort, and primary personal interaction - are presented and interpreted. (Author)

AD-288 832 Div. 28, 30
(TISTB/AW) OTS price $2.60

System Development Corp., Santa Monica, Calif.
OBSERVING HOW HUMANS MAKE MISTAKES TO DISCOVER HOW TO GET COMPUTERS TO DO LIKEWISE,
by L. E. Travis. 25 June 62, 21p. incl. illus. 8 refs. (Rept. no. SP-776)
Unclassified report

DESCRIPTORS: *Cybernetics, Man, Computers, Reasoning, Errors, Analysis.

Psychological methods are adapted to observe nature's design of intelligence. The designer of intelligent machines can get a lot of ideas about programming the computer by introspecting his own and other's stupidity. Examples of approaches to solving a mathematical problem are presented. The technique of having subjects

''think aloud'' as they solve problems is discussed. The importance of observing and admitting mistakes made on the way to successful problem solution is emphasized. (Author)

AD-288 888 Div. 28
(TISTB/AW) OTS price $.50

Ohio State U., Columbus.
PURSUIT AND COMPENSATORY MODES OF INFORMATION DISPLAY: A REVIEW.
Report on Psychological Research on Human Performance,
by George E. Briggs. Aug 62, 13p. incl. illus. table, refs.
(Contract AF 33(616)6107, Proj. 7183)
(AMRL TDR 62-93) Unclassified report

DESCRIPTORS: *Tracking, *Display systems, Motor reactions, Feedback, Human engineering.

A review of the literature on pursuit vs. compensatory modes of display for continuous control (tracking) tasks is presented. It covers published research on this topic to October 1961. The review is concerned only with those research studies in which a comparison was made of the two display modes. The review summarizes both the empirical data and the theoretical interpretations in this research area. (Author)

AD-289 060 Div. 28
(TISTB/MS) OTS price $2.60

Duke U., Durham, N. C.
COMMUNICATION IN THE INTERVIEW AND THE DISENGAGED RESPONDENT,
by Kenneth J. Gergen and Kurt W. Back. 1962, 28p. incl. tables (Technical rept. no. 4)
(Contract Nonr-118111)
Unclassified report

Revision of a paper read at the annual meeting of the American Psychological Association, Sep. 1962.

DESCRIPTORS *Personality, *Public opinion, Public opinion polls, *Sociometrics, Attitudes, Social communication, Behavior, Age, Analysis, Measurement.

The standard response in the survey interview was found to take on a specific kind of significance. The investigator need not ask himself whether any given response was ''truly'' representative of the person's opinion. Rather, given the type of situation represented by the survey interview, and given the type of question used, in what other situations is it likely that this same response will occur. Applying this reasoning, it might be anticipated that given the social nature of the interview, the elderly person can be expected to fail to respond or differentiate in numerous other superficial social situations. However, if one is interested in predicting flavor preference or voting behavior, for example, when the person is faced with a decision where more is at stake, different results might be expected. In terms of future investigations what seems to be indicated is a better understanding of significant learning experiences and of the conceptual commonalities of varying situations. (Author)

AD-289 061 Div. 28
(TISTB/MS) OTS price $2.60

Duke U., Durham, N. C.
THE PROPER SCOPE OF SOCIAL PSYCHOLOGY,
by Kurt W. Back. 1962, 17p. table (Technical rept. no. 5)
(Contract Nonr-118111, Proj. NR 179-740)
Unclassified report

DESCRIPTORS: *Psychology, Theory, Social communication, Sociology, Analysis.

Social psychology is shown as having, in its rejection of grand theory, also abandoned many of its significant problems. In order to define a kind of theory which could be precise and deal with these problems the field of social psychology is defined, in relation to sociology and psychology. Each of the latter is dealing with a self-contained system independent of the other. Modal logic is used to represent each system. As each system is self-contained, there can be interaction between systems, there can be conflicts, and there can be areas of action not covered by either system. The field of social psychology consists of those situations where action of the individual and the forces of organized society interact. A social psycological theory which starts at the point of contact of the two systems and explores all ramifications from experimental situations to historical patterns is introduced as full-range theory. Examples of this social psychological formulation are shown for the concepts of conformity and roles. (Author)

AD-289 095 Div. 28
(TISTB/MS) OTS price $2.60

New York U., N. Y.
THE USE OF CRITERIONAL MEASURE.
Technical rept. no. 1 on The Investigation of Criterional Variables and their Relation to Proficiency Measures,
by Joseph Weitz. Nov 62, 21p. incl. illus. 12 refs.
(Contract Nonr 28551)
Unclassified report

DESCRIPTORS: *Learning, Decision making, Job analysis, Needs, Psychometrics, Transfer of training, Verbal behavior, Measurement, Standards, Tests.

Using paired associate learning tasks of different difficulty level, it is shown that independent variables such as task order are more or less effective, depending upon when the criterional measures are taken and the level of the criterion used. Similarly, the time of measurement and level of difficulty of the criterion is related to whether or not we find an effect of what is called ''drive'' in learning situations. An attempt is made to show how this approach may be useful in interpreting the meaning of independent variables. (Author)

AD-289 296 Div. 28
(TISTB/MS) OTS price $2.60

American Inst. for Research, Santa Barbara, Calif.
RESPONSE GUIDANCE, RESPONSE-TERM SIMILARITY, AND TEST TYPE IN THE LEARNING AND RETENTION OF WORK PAIRS,
by David Angell and Donald F. Terry. Sep 62, 25p. incl. illus. tables, 13 refs. (Research rept. no. AIR-C14-9/62-TR)
(Contract AF 49(638)681)
Unclassified report

DESCRIPTORS: *Learning, *Memory, *Training, Verbal behavior, Tests, Vocabulary, Effectiveness.

It was hypothesized that: (1) high cueing level would be more effective than low cueing, (2) the influence of cueing would be greater when

easily confusable incorrect alternatives were present during training than when less easily confusable alternatives were present, (3) training with easily confusable alternative response terms would be more effective than training with less confusable alternatives when the criterion behavior required discriminating between the correct response term and the easily confusable alternatives. Both immediate and delayed test results bore out the first hypothesis. The second hypothesis was confirmed by comparisons made on the results of the test coming at the end of the acquisition session. The third hypothesis was confirmed for the high and medium cueing levels but not for the low cueing level. It was also found that Ss who took recall tests during training performed better on the delayed retention tests than Ss who took recognition tests during training. It was concluded that prompting is more effective than anticipating in discrimination training, and that when high probability incorrect alternatives are presented, eliciting only the correct response is efficient training when the criterion behavior involves discriminating among the high probability alternatives. (Author)

AD-289 368 Div. 28
(TISTB/MS) OTS price $6.60

Applied Psychological Services, Villanova, Pa.
INFORMATION TRANSFER IN DISPLAY-CONTROL SYSTEMS. V. EXPANSION AND ELABORATION OF THE DEI TECHNIQUE.
Quarterly progress rept. no. 5, 16 June-15 Sep 62,
by Arthur I. Siegel, William Miehle and Philip Federman. 15 Sep 62, 58p. incl. illus. tables.
(Contract DA 36-039-sc-87230, Proj. 95-02-001)
Unclassified report

DESCRIPTORS: *Display systems, *Control systems, Test equipment, Psychometrics, Applied psychology, Operation, Human engineering, Test methods, Test methods.

Strengthening and elaboration of the display evaluative technique, a method for assessing the ability of the displays in a display operator decision control action loop to transfer information and for the operator to act on this information, are described. Additional concepts now included in the DEI are information precursor, information load, transfer criticality, and utilization efficiency. Application of the expanded technique to eight Signal Corps' systems suggests that the technique possesses sensitivity for achieving its purpose. (Author)

AD-289 509 Div. 28
(TISTB/LMH) OTS price $1.10

Stanford U., Calif.
PERCEPTION OF LEADERSHIP IN SMALL GROUPS.
Annual rept. no. 1,
by Thomas W. Harrell. 16 Oct 62, 9p.
(Contract Nonr-22562)
Unclassified report

DESCRIPTORS: *Leadership, *Behavior, Group dynamics, Sociometrics, Coding, Perception, Psychology, Test methods.

The first phase of the study consists of a session for the purpose of training observers in coding skills, and for developing their sensitivity to conference behavior. This session consists of a discussion on objectives and methodology, then a practice session in observing and coding a group discussion. The second session is a multiple-group session in which subjects are divided into five-man groups. Each group is assigned two or more observer-coders, and each group then engages in a ''leaderless discussion'' of a human relations case problem. The behavior of each participant in each group is coded by observers. At the conclusion of the multiple-group sessions, each participant is asked to rate the contribution of each of the members of his discussion group on a questionnaire form. The form is attached as an appendix to this report. (Author)

AD-289 544 Div. 28
(TISTB/LMH) OTS price $3.60

Human Engineering Lab., Aberdeen Proving Ground, Md.
DESIGN OF A PICTURE LANGUAGE TO IDENTIFY VEHICLE CONTROLS. III. A COMPARATIVE EVALUATION OF SELECTED PICTURE-SYMBOL DESIGNS,
by Robert Karsh and Samuel A. Mudd. Aug 62, 35p. incl. illus. tables, 3 refs. (Technical memo. no. 15-62)
Unclassified report

DESCRIPTORS: *Vehicles, *Coding, Identification, Language, Military equipment, Statistical data, Human engineering, Feasibility studies.

This study investigated the accuracy of identification of each of 90 picture-symbol designs with each of 34 vehicle control names. Two sets of designs were evaluated. The set which had been empirically derived in a preceding study was found to be more effective than the set which had not been empirically derived. Effective symbols were found for 24 out of 34 vehicle control names. Ten new symbols have been developed. They will be presented subsequent to further evaluative tests. (Author)

AD-289 565 Div. 28, 30
(TISTB/MS) OTS price $11.00

Stanford Research Inst., Menlo Park, Calif.
AUGMENTING HUMAN INTELLECT: A CONCEPTUAL FRAMEWORK.
Summary rept.,
by D. C. Engelbart. Oct 62, 134p. incl. illus. 28 refs.
(Contract AF 49(638)1024)
(AFOSR-3223) Unclassified report

DESCRIPTORS: *Reasoning, *Computers, *Data processing systems, Cybernetics, Information theory, Effectiveness.

This is an initial summary report of a project taking a new and systematic approach to improving the intellectual effectiveness of the individual human being. A detailed conceptual framework explores the nature of the system composed of the individual and the tools, concepts, and methods that match his basic capabilities to his problems. One of the tools that shows the greatest immediate promise is the computer, when it can be harnessed for direct on-line assistance, integrated with new concepts and methods. (Author)

AD-289 570 Div. 28
(TISTB/MS) OTS price $16.50

Washington U., Seattle.
INTRA-INDIVIDUAL FACTOR ANALYSES WITH ROTATION TO MAXIMUM SIMILARITY,
by Harold William Burk. Sep 62, 241p. incl. illus. tables, 37 refs.
(Contract Nonr-47733 and Grant M-743(C7))
Unclassified report

DESCRIPTORS: *Personality, *Behavior, *Factor analysis, Matrix algebra, Measurement.

The primary purpose of this study was to gain knowledge of personality through the development of (1) objective methods of measuring individual behavior over time, and (2) procedures for relating the measures among individuals. A secondary aim of the study was the examination of the patterns of behavior to find out which behavior characteristics were more similar or prevalent among subjects and which characteristics were more individual. To accomplish this purpose, six schizophrenic subjects were selected from a mental hospital population. They were chosen because patterns of behavior differed among subjects and were expected to vary over time. Repeated measurements were taken for these subjects, using physiological, psychological, psychomotor, and environmental variables. Conditions of measurement were controlled as carefully as possible to minimize serial correlation and errors of measurement. The resulting data matrices were factor analyzed, and analyses being discontinued after the extraction of about 2/3 the variance with ten factors. This study showed that P-technique does not necessarily lead to new labels, but it showed that for each subject there are many important differences occurring over time within a label, just as there are differences in performance among subjects who are simultaneously assigned the same IQ test label. (Author)

29. QUARTERMASTER EQUIPMENT AND SUPPLIES

AD-287 911 Div. 29
(TISTB/MD) OTS price $4.60

Quartermaster Research and Engineering Command, Natick, Mass.
PROCEEDINGS OF THE TEXTILE AND CLOTHING SEMINAR HELD AT THE QUARTERMASTER RESEARCH AND ENGINEERING CENTER ON INDUSTRY DAY, 17 AND 18 MAY 1962.
Sep 62, 45p. incl. illus. (Textile series rept. no. 121)
Unclassified report

DESCRIPTORS: *Textiles, *Protective clothing, *Symposia, Industrial research, Military research, Military requirements.

This report of a seminar held at the Quartermaster Research and Engineering Center on 17-18 May 1962 includes papers by representatives of the Air Force, Army and Navy on applications of textiles and clothing for space, for nuclear and limited warfare, and for surface ships and submarines. Problems faced by the military departments in these areas and approaches to the solution of difficult technical problems are discussed. Presentations by members of a panel from the textile industry cover the interrelationship of industrial and military research and the role of industry in making its resources available to the military in our present economy. (Author)

AD-288 228 Div. 29, 18
(TISTB/MS) OTS price $7.60

Naval Radiological Defense Lab., San Francisco, Calif.
THE FAMILY OCCUPANCY TEST, 4-6 NOVEMBER 1960,
by W. E. Strope, H. S. Etter and others.
22 Aug 62, 70p. incl. illus. tables, 5 refs.
(Rept. no. NRDL TR-578)
Unclassified report

DESCRIPTORS: *Shelters, *Air raid shelters, *Underground structures, Civilian defense systems, Children, Women, Noise, Diet, Recreation, Acceptability, Design.

The USNRDL experimental shelter at Camp Parks, California, was occupied for a period of 48 hours by 99 men, women, and children. Ages of the participants ranged from about 3 months to 68 years. Family size ranged from single persons to a family of seven. All aspects of the shelter environment as well as the actions and response of the shelterees were monitored. Children of all ages appeared to adapt well to shelter conditions, but the importance of careful preparation, organization, and control of activities was demonstrated. This is a preliminary report made in advance of complete analysis of the data. (Author)

AD-288 425 Div. 29
(TISTB/SAT) OTS price $1.60

Army Arctic Test Board, Fort Greely, Alaska.
SERVICE TEST OF CAP, COLD WEATHER, T61-3.
31 May 62, 15p. (Proj. no. ATB 3-212)
Unclassified report

DESCRIPTORS: *Protective clothing, Arctic regions, Head.

AD-289 258 Div. 29
(TISTB/LMH) OTS price $1.60

Armour Research Foundation, Chicago, Ill.
INVESTIGATION OF FOOTWEAR FOR PROTECTION AGAINST LAND MINES.
Annual progress rept. Mar-Oct 62,
by John L. MacDonald. Nov 62, 14p. incl. illus. 20 refs. (Rept. no. ARF 8249)
(Contract DA 49-193-md-2247)
Unclassified report

DESCRIPTORS: *Protective clothing, *Shoes, Land mines, Blast, Explosives, Safety devices, Attenuation, Injuries, Design, Pressure, Vulnerability.

The development of protective footwear that is resistant to small enti-personnel mine blast effects is discussed. One objective is to determine the degree of protection or attenuation which must be provided by the protective footwear. This objective is related to the damage threshold or capabilities of the foot to tolerate abrupt impulsive loadings and the physical characteristics of the exploding mine. Accordingly, this program was established to provide a device which would simulate a controlled explosive environment to be used for the assessment of the damage threshold of an unprotected human foot. An additional objective is the determination of the pressure-time and impulse generated by an anti-personnel mine. The M-14 anti-personnal mine is to be used for this investigation. (Author)

30. RESEARCH AND RESEARCH EQUIPMENT

AD-287 996 Div. 30
(TISTB/AW) OTS price $.75

Biomedical Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
DESCRIPTION AND PERFORMANCE EVALUATION OF THE AEROSPACE MEDICAL RESEARCH LABORATORIES' VERTICAL ACCELERATOR.
Report on the Generation, Propagation, Action, and Control of Acoustic Energy,
by R. D. Lowry and W. M. Wolff. Dec 61, 23p. incl. illus.
(Proj. 7210)
(ASD TR 61-743) Unclassified report

DESCRIPTORS: *Test facilities, *Vibration mechanisms, *Impact shock, *Space environmental conditions, Acceleration, Vibration, Space medicine, Astronautics, Man, Simulation.

The Aerospace Medical Research Laboratories' vertical accelerator was developed for bioastronautics research to simulate vibration and buffeting encountered in aerospace operations. The design, motion capabilities, control and safety features are described. This vertical accelerator can be programmed with periodic or random acceleration patterns obtained from actual environmental measurements. It is a complex electromechanical device employing a unique type of friction drive to move a test platform with a 200-lb load capacity. The accelerator, for continuous operation, can produce peak to peak amplitudes within 5 ft over the frequency range from 0.5 cps to 10 cps. The maximum acceleration output is from 2.5 to 3 G depending on load and permissible distortion. (Author)

AD-288 020 Div. 30, 25
(TISTP/WH) OTS price $1.60

White Sands Missile Range, N. Mex.
SOME ERRORS ASSOCIATED WITH ACOUSTICAL WIND MEASUREMENTS THROUGH A LAYER,
by John W. Coffman and Robert G. Price. Oct 62, 13p. incl. illus. (Technical rept. no. SELWS-M-12)
Unclassified report

DESCRIPTORS: *Acoustics, *Wind, *Anemometers, *Radiosondes, Atmosphere, Measurement, Microphones.

An acoustic wind measuring array consisting of a transmitter and two receivers is investigated. The error incurred by assuming that the wind component in the line of sensors is dependent solely on the time delay of the sound front arrival at the two receivers is found. For an orientation suitable for measuring the horizontal flow through a layer, the error is less than 7% for cross-wind components less than 30 mph and the temperature through the layer known to ± 1 degree centigrade. (Author)

AD-288 053 Div. 30
(TISTP/TL) OTS price $3.60

Operations Research Center, U. of Calif., Berkeley.
ON DIAGONALIZATION METHODS IN INTEGER PROGRAMMING,
by Richard Van Slyke and Roger Wets. 1 Aug 62, 25p. incl. illus. tables, 2 refs. (Research rept. no. 27; Rept. no. IER 172-32)
(Contract Nonr-22283)
Unclassified report

DESCRIPTORS: *Programming, *Coding, *Scheduling, *Functional analysis, Analog systems, Transformation (Mathematics), Vector analysis, Matrix algebra.

Improvement in the existing area of integer programming codes in the easy generation of efficient cutting hyperplanes is studied. In this analysis the problem is approached by using a triangular canonical form. In part 1 an algorithm is given based on Gomory's all-integer integer programming algorithm, which constitutes a first step in this direction. This procedure is a practical analog of a deepest cut method discussed in the second part of the analysis. A brief outline and flow diagram for the algorithm are given; finally the algorithm and the deepest cut problem are illustrated by examples. (Author)

AD-288 066 Div. 30, 26
(TISTM/TCG) OTS price $2.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
BASIC RESEARCH IN AMERICAN INDUSTRY.
Technical rept., second edition,
by M. H. Hodge, Jr. Sep 61, 24p. incl. illus.
(Rept. no. LMSC-703736-1)
Unclassified report

DESCRIPTORS: *Industry, *Industrial research, Statistical analysis, Effectiveness, Physics, Chemistry, Mathematics, Chemicals, Drugs, Machines, Space flight, Electrical equipment, Communication systems, Test methods, Petroleum.

Methods are presented for analyzing the relative basic research performance of industrial firms. These methods are then applied in an analysis of basic research by American industrial firms in the fields of physics, mathematics, and chemistry during the years 1957 through 1960. Basic research is found to be almost entirely confined to six industries: electrical equipment and communications, chemicals, petroleum, drugs, machinery, and aerospace. This analysis indicates that the electrical equipment and communications industry dominates American industrial basic research in the physical sciences. Of the individual companies, dominant leadership is held by the American Telephone & Telegraph Company and the General Electric Company. (Author)

AD-288 067 Div. 30, 2, 6, 8, 17, 20, 16
(TISTB/SAT) OTS price $22.25

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
PROCEEDINGS OF THE 1962 ARMY SCIENCE CONFERENCE UNITED STATES MILITARY ACADEMY, WEST POINT, N. Y. 20-22 JUNE 1962. VOLUME I. (PRINCIPAL AUTHORS ''A'' THRU ''K'').
19 Sep 62, 421p. incl. illus. tables, refs.
Unclassified report

DESCRIPTORS: *Military research, *Scientific research, *Symposia, Alloys, Submarines, Metabolism, Radio interference, Optics, Recoilless rifles, Mine detectors, Nuclear physics, Medicine, Anthrax, Ordnance, Tularemia, Immunization, Upper atmosphere, Food.

AD-288 145 Div. 30, 28
(TISTB/AW) OTS price $12.00

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
ADAPTIVE MAN-MACHINE CONCEPT-PROCESSING.

Final rept.,
by M. Kochen, C. T. Abraham, and E. Wong.
14 June 62, 156p. incl. illus. tables, refs.
(Contract AF 19(604)8446, Proj. nos. 5632 and 5633)
(AFCRL 62-397) Unclassified report

DESCRIPTORS: *Memory devices, *Information retrieval, *Data processing systems, Data storage systems, Cybernetics, Language, Reasoning, Simulation.

An adaptive man-machine non-arithmetical information processing system is proposed which centers around a novel type of memory organization and a formal language for representing and recording information. The memory is regarded as a large network of names interlinked through various predicates. Each name is characterized by how it is embedded in this net. Local concentrations of densely interconnected names form the basis of memory organization. This organization adapts to the incoming stream of information and queries. Queries are posed and answered, both by user and machine, in a conversational process during which the user's and machine's level of informedness about the topic are matched. Partial answers, leading to further questions, to requests like ''What recorded sentences state facts common to V. Bush, N. Wiener and J. von Neumann'' can be printed in English. The key theoretical problem is to estimate the length of the ''training'' period before queries can be adequately serviced. Critical information content and minimal processing capabilities to produce useful machine responses are mathematically analyzed. (Author)

AD-288 241 Div. 30
(TISTP/FR) OTS price $3.60

System Development Corp., Santa Monica, Calif.
JOVIAL FOR THE DILETTANTE. PART 1.
by Millard H. Perstein. 8 Oct 62, 40p. incl. table (Technical memo. no. TM-555/061/00)
Unclassified report

DESCRIPTORS: *Programming, Digital computers, Languages.

A limited portion of JOVIAL sufficient to construct complete programs from input, through a variety of processing, to final output is explained. Rules for getting a first program running correctly are given. JOVIAL language media is described, and some elements of JOVIAL language, its arithmetic expressions, assignment statements, and procedures are set forth. Library procedures required for handling input of data and output of results are specified. (Author)

AD-288 246 Div. 30, 2
(TISTP/FR) OTS price $1.60

Texas A. and M. Coll., College Station.
RELIABILITY AT SEA OF LACOSTE-ROMBERG SURFACE-SHIP GRAVITY METER S-9 WHEN ACCELEROMETER DAMPING IS 0.75 THAT OF CRITICAL,
by Peter Dehlinger and B. R. Jones. 20 Sep 62, 19p. incl. illus. tables, 5 refs.
(Contract Nonr-211904, Proj. NR 083-836)
Unclassified report

DESCRIPTORS: *Gravity, Oceans, Measurement, Instrumentation, Ships, Reliability.

Tests were made at sea with the LaCoste-Romberg surface-ship gravity meter S-9 while its horizontal accelerometers were 0.75 critically damped. These tests supersede those reported previously in which the accelerometers were overdamped. Performance of the meter with the new accelerometers is a very significant improvement over that with overdamped accelerometers. Both the systematic and random errors have been greatly reduced when Browne corrections are low to moderate. Measurements with the present meter at Browne corrections below 275 mgal were found to be reliable a required no empirical correction; those at Browne corrections greater than 275 mgal (300-500) were observed to be in constant error along any one profile in an unchanging sea. Presumably the error at the larger accelerations is of electronic origin, in which case it can be eliminated. Investigations will be made into the source of the difficulty; when corrected, further sea tests will be made at Browne corrections larger than 300 mgal. As a result of these tests, the anomalies obtained from measurements with meter S-9 since February, 1962 at Browne corrections consistently below 275 mgal can be considered correct in absolute value; those obtained at corrections consistently above 275 mgal can, to a first approximation, be considered indicative of anomaly variations, but incorrect in absolute value. (Author)

AD-288 297 Div. 30
(TISTA/SEB) OTS price $7.60

Ohio State U., Columbus.
DESIGN PERFORMANCE AND OPERATIONAL CHARACTERISTICS OF THE ARL TWENTY-INCH HYPERSONIC WIND TUNNEL,
by G. M. Gregorek and J. D. Lee. Aug 62, 62p. incl. illus. 9 refs.
(Contract AF 33(616)7451, Proj. 7065)
(ARL 62-392) Unclassified report

DESCRIPTORS: *Hypersonic wind tunnels, Wind tunnel nozzles, Design, Configuration, Electric arcs, Operation, Theory, Temperature, Pressure, Mathematical analysis, Velocity, Gas flow, Diffusers, Hypersonic nozzles, Wind tunnel nozzles.

The ARL 20-in. Hypersonic Wind Tunnel is a blowdown type, free-jet installation that can deliver air at Mach numbers from 8 to 14 at free stream Reynolds numbers of 1 to .03 times 10 to the 7th power per foot. The report discusses some of the initial considerations influencing the configuration of the facility and presents theoretical performance estimates of its aerodynamic components; i.e., the electric resistance heater, the nozzle, the diffuser and the vacuum supply. Operational characteristics such as mass flow rates, electric power requirements, sphere evacuation rates, etc., are also treated for the full range of Mach numbers. Brief discussions on the extension of testing time and on the character of the delivered air flow are included. Mechanical design, control systems, and wind tunnel instrumentation of the facility are not considered. (Author)

AD-288 436 Div. 30
(TISTB/CCH) OTS price $1.60

Aeronautical Chart and Information Center, St. Louis, Mo.
CATALOG OF PUBLICATIONS.
July 62, 7p.
Unclassified report

DESCRIPTORS: *Catalogs, *Indexes, *Military publications, *Aeronautics.

Division 30 - RESEARCH AND RESEARCH EQUIPMENT

AD-288 437 Div. 30
(TISTB/CCH) OTS price $1.10

Aeronautical Chart and Information Center, St. Louis, Mo.
SUPPLEMENT TO CATALOG OF PUBLICATIONS.
Aug 62, 4p.
Unclassified report

DESCRIPTORS: *Catalogs, Targets, Data, Aeronautics, Military publications, Geodetic data.

AD-288 506 Div. 30, 9
(TISTM/BRW) OTS price $2.00.

Laboratories for Applied Sciences, U. of Chicago, Ill.
CHARACTERIZATION AND EXTENSION OF SIMULATION CAPABILITIES OF THE LAS HIGH TEMPERATURE ARC FACILITY.
Final rept., 16 Mar 61-15 Mar 62 on The Chemistry and Physics of Materials,
by Henry Halle and Channon F. Price. Aug 62, 72p. incl. illus. tables, 8 refs.
(Contract AF 33(616)8115, Proj. 7360)
(ASD TDR 62-461) Unclassified report

DESCRIPTORS: *Electric arcs, *Test facilities, Hypersonics, Simulation, Re-entry aerodynamics, High temperature research, Vacuum furnaces, Ablation, Materials, Tests, Plasma physics.

The operation of an existing subatmospheric plasma arc facility was characterized to assist the user in selecting the proper simulation conditions for materials test application. Eight principal test conditions were established within the operating limits of the arc, and the pertinent parameters describing the thermal environment were determined and tabulated. Subsequently, the hypersonic re-entry conditions corresponding to the thermal environment of the test conditions were computed and plotted on a velocity-altitude chart. In addition, an arc unit with water-cooled, non-consumable electrodes was developed to reduce contamination of the arc plasma. This arc, having double-ring electrode configuration, will generate plasma with a net average enthalpy of 8000 Btu/lb. The final phase concerned testing various materials under different exposure conditions. (Author)

AD-288 524 Div. 30
(TISTA/SEB) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
MUFFLING THE NOISE OF TESTING STATIONS OF AIRCRAFT-ENGINE FACTORIES,
by I. K. Razumov. 16 Oct 62, 8p. incl. illus.
(Trans. no. FTD-TT 62-1277 from Gigiyena I Sanitariya, No. 1, pp. 100-104, 1961)
Unclassified report

DESCRIPTORS: *Test facilities, *Airplane engine noise, Jet engine noise, Damping, Attenuation, USSR, Translations, Airplane engines.

The combatting of noises at the testing stations of aircraft-engine factories is carried on by the method of collective protection against noise, and is accomplished in two ways: muffling the noise emitted from the intake and exhaust channels and sound insulation against the noises penetrating through the partitions of the test cabinets. (Author)

AD-288 529 Div. 30
(TISTE/CAM) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
MN-7 MINIATURE NONLINEAR ELECTRONIC SIMULATOR.
11 Oct 62, 7p. incl. illus. (Trans. no. FTD-TT-62-1230 from Tsbnti, Moskva, Mashinostroyeniya, pp. 1-9, 1960)
Unclassified report

DESCRIPTORS: *Miniature electronic equipment, *Control simulators, *Analog computers, Nonlinear systems, Differential equations, Integration, Translations, Switching circuits, Electron beams, Cathode ray tube screens.

The MN-7 nonlinear, electronic simulator is an analog mathematical machine, designated for investigating the dynamics of systems and objects of automatic control, the motion of which is recorded by ordinary differential equations, having a small amount of nonlinear dependencies. For the solution of more complex nonlinear systems, the parallel work of two or more such devices is possible. A solver unit, an I-5 electronic-beam indicator and an ESV-6 power unit are included in the MN-7 electro-simumbuor. There are 1[illegible] DC amplifiers in the solver unit, which perform the operations of integration, differentiation, summation and scale conversion. The amplifiers have a three-cascade system, a static power coefficient (without reverse communications) of approximately 40,000, a transmission band (during negative reverse communication) of approximately 150 c and zero drift of 5 mv after 10 minutes. The solver unit has eight diode elements, which, at collective switching with amplifiers, permit simulation of an ambiguous or discontinuous function of the hysteresis loop, dry friction, zone of insensitivity. (Author)

AD-288 542 Div. 30
(TISTP/FR) OTS price $2.60

System Development Corp., Santa Monica, Calif.
THE LEVIATHAN TECHNIQUE FOR EFFECTING AND MONITORING LIVE-ARTIFICIAL COMMUNICATIONS,
by Sydney C. Rome and Beatrice K. Rome.
26 Sep 62, 28p. incl. illus. tables (Technical memo. no. TM-761)
Unclassified report

DESCRIPTORS: *Social communication, Simulation, Digital computers, Display systems.

In the Leviathan dual-mode simulation, live subjects occupying managerial roles communicate with one another and with automated personnel. This communication takes place over the computer by means of pushbuttons and digital displays. Automated agents, carrying out the productive, technological work of the organization, receive and implement orders and decision rules. These reflect the intentions, policies, and plans of the higher-level, governing, live decision makers. The program requirements for the communication process from live managers to artificial agents, and for monitoring transgressions of authority are established. (Author)

AD-288 589 Div. 30
(TISTP/JW) OTS price $1.10

Kaman Nuclear, Colorado Springs, Colo.
DEVELOPMENT AND FABRICATION OF NON-DESTRUCTIVE SPECIFIC GRAVITY MEASURING EQUIPMENT EMPLOYING RADIATION TECHNIQUE.

Monthly progress rept., 1-30 Sep 62.
30 Sep 62, 2p. (Rept. no. 58-92-PR-49)
(Contract DA 19-059-501-ORD-2631)
Unclassified report

DESCRIPTORS: *Non-destructive testing, Analog-to-digital converters, Density, Radiation effects, Measurement, Gravity.

AD-288 668 Div. 30
(TISTA/SEB) OTS price $5.60

Stanford U., Calif.
MEASUREMENTS OF PRESSURE AND SPEED OF FLOW IN A SPARK-HEATED HYPERSONIC WIND TUNNEL,
by Krishnamurty Karamcheti, Walter Vali and others. Nov 62, 58p. incl. illus. tables, 15 refs.
(Contract AF 40(600)930, Proj. 8952)
(AEDC TDR 62-218)
Unclassified report

DESCRIPTORS: *Hypersonic wind tunnels, *Wind tunnel nozzles, Hypersonic nozzles, Electric arcs, Pressure, Velocity, Pitot tubes, Schlieren photography, Enthalpy, Heat transfer, Errors, Measurement, Analysis, Gas flow.

The nature of the flow and state of the gas in the nozzle and test section of the Stanford spark-heated hypersonic wind tunnel was studied. Attention is given only to the pressure and speed-of-flow measurements. Results are presented for pitot pressures and wall static pressures. The speed of flow in the test section is derived from measurements made by spark-schlieren photographs of a disturbance created in the flow by means of a spark discharge. On the basis of these measurements, it is concluded that the actual stagnation enthalpy of the stream is likely to be different from the enthalpy calculated according to current practice. As a consequence, it is shown that serious errors may occur in the calculated values for the state of the flow, and in theoretical estimates of quantities such as stagnation-point heat-transfer rates. (Author)

AD-288 675 Div. 30, 9, 12
(TISTA/SEB) OTS price $2.60

Aerospace Corp., Los Angeles, Calif.
AERODYNAMICS PROGRAM RE-ENTRY PHYSICS. ROTATIONAL TEMPERATURE MEASUREMENTS.
Semiannual technical rept., 1 Jan-30 June 62, by F. S. Roehrs. 21 Aug 62, 18p. incl. illus. table, 3 refs. (Rept. no. TDR-69(2230-08)TR-1)
(Contract AF 04(695)69)
(DCAS TDR 62-174) Unclassified report

DESCRIPTORS: *Temperature, *Re-entry aerodynamics, Electron beams, Nitrogen, Molecules, Gas ionization, Integral equations, Differential equations, Luminescence, Excitation, Aerodynamic heating, Electrons, Measurement.

A theoretical investigation is presented of the electron beam temperature probe technique. The investigation includes analytic expressions for the important spontaneous emission coefficients, analytic expressions for the important optical excitation cross sections, an expression for calculating the power radiated by each rotational line in the R branch of a given band in the N2(+) first negative system, a description of the dependence of the emitted radiation on electron flux density and other factors, and an explanation for the appearance of optical selection rules in the electron excitation process. (Author)

AD-288 772 Div. 30, 20
(TISTM/TCG) OTS price $1.10

Kaman Nuclear, Colorado Springs, Colo.
DEVELOPMENT AND FABRICATION OF NON-DESTRUCTIVE SPECIFIC GRAVITY MEASURING EQUIPMENT EMPLOYING RADIATION TECHNIQUE.
Monthly progress rept., 1-31 May 62.
31 May 62, 5p. (Rept. no. 58-92-PR-45)
(Contract DA 19-029-501-ORD-2631, Proj. TA2-8051)
Unclassified report

DESCRIPTORS: *Non-destructive testing, *Density, *Measurement, *Radiation instruments, Radioactivity, Instrumentation, Test equipment.

AD-288 833 Div. 30
(TISTB/AW) OTS price $4.60

System Development Corp., Santa Monica, Calif.
INFORMATION SYSTEM PERFORMANCE EVALUATION,
by Elias H. Porter and John H. Proctor.
24 Oct 62, 41p. incl. illus. tables, 25 refs.
(Rept. no. SP-897/000/01)
(In cooperation with The Mitre Corporation)
Unclassified report

DESCRIPTORS: *Operations research, *Management engineering, *Control systems, Simulation, Training, Air Defense Command, Design, Information theory, Time, Military operations, Analysis, Effectiveness.

The performance of large-scale, man-machine information systems is evaluated. Problems arise in that systems are designed to accomplish certain goals and purposes, and these change with time. System performance can be tested in simulated environments established to promote training and system evolution. The Air Defense Command System training program is described, and it is shown how it can be used to evaluate system performance in the face of unpredicted stimulus situations, system degradation and unknown consequences of actions. Normative exercising and how it is being used as an analytical and evaluative aid for design purposes in the early stages of a given system's evolution is described. (Author)

AD-288 836 Div. 30, 23
(TISTB/LMH) OTS price $1.60

System Development Corp., Santa Monica, Calif.
INFORMATION RETRIEVAL SYSTEMS AND EDUCATION,
by Don Bushnell and Harold Borko. 18 Sep 62, 12p. incl. illus. 22 refs. (Rept. no. SP-947/000/01)
Unclassified report

Presented at the American Psychological Association Convention St. Louis, Missouri, 1 September 1962.

DESCRIPTORS: *Education, *Library science, *Information retrieval, Literature, Documentation, Coding, Data processing systems, Teaching machines, Computers, Automation.

An information retrieval system which would serve the information needs of the educator and student would have to include the functions already to be found in present hardware systems and the automation of acquisition, classification, and dissemination functions. Characteristics of an advanced school system of the 1970s in which universities or secondary schools will be linked by data transmission lines to regional information centers are envisioned. These centers will acquire, translate, and select items of information for automatic indexing, abstracting, and coding into magnetic tape files for subsequent

feeding to remote school systems. Both the educator and the student use of the school's information retrieval system can be serviced by different organizations of the same information. This report supersedes SP-947. (Author)

AD-288 837 Div. 30, 23, 28
(TISTE/OHD) OTS price $1.60

System Development Corp., Santa Monica, Calif.
PROGRAMMED DECISIONS IN PROGRAMMED INSTRUCTION,
by John E. Coulson. 13 Aug 62, 12p. incl. illus. 2 refs. (Rept. no. SP-933/001/00)
Unclassified report

DESCRIPTORS: *Teaching machines, *Education, *Automation, Students, Data processing systems, Programming, Learning, Digital computers, Human engineering.

The adaptiveness of programmed teaching materials to individual student differences is largely accomplished through flexible sequences known as branching programs. Computer-based instruction systems are considered from the point of view of the lesson designer. Early experimental computer-based instructional systems and CLASS (Computer-based Laboratory for Automated School systems) are described. CLASS is designed for research on the use of modern data-processing equipment not only for instruction but for other important educational activities such as counseling, administration, class assignment scheduling, and the storage and processing of student and fiscal records. (Author)

AD-288 863 Div. 30
(TISTB/LMH) OTS price $1.25

Behavioral Sciences Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
SURVEY OF REMOTE HANDLING IN SPACE.
Final rept., Oct 60-Mar 61 on Human Factors in Advanced Flight,
by D. Frederick Baker. Sep 62, 42p. incl. illus. table.
(Proj. 7184)
(AMRL TDR 62-100) Unclassified report

DESCRIPTORS: *Space environmental conditions, *Remote control systems, *Space capsules, Extraterrestrial bases, Prosthetics, Handling, Tools, Safety devices, Human engineering.

A survey of industrial opinion on remote handling in space was undertaken to document early concepts and to identify areas of agreement, areas of conflict, and unique ideas relating to the subject. Seven industrial concerns and one military agency provided papers on the role of remote handling in space. These papers are discussed in terms of: (a) remote operations of which there are five major categories-maintenance, assembly, experimentation, transfer operations, and emergency operations; (b) space vehicle design-the manned lightweight capsule, with anthropomorphic gloves, stabilization arms, window ports, and two to three manipulator arms, being representative; (c) manipulator design-concerning actuation, configuration, control, and feedback systems; and (d) space environment factors-vision, weightlessness, temperature fluctuations, high-energy radiation, and micrometeorite collisions. (Author)

AD-288 966 Div. 30
(TISTW/RD) OTS price $1.60

Technical Operations, Inc., Burlington, Mass.
CL-I, AN ENVIRONMENT FOR A COMPILER,
by T. E. Cheatham, Jr., G. O. Collins, Jr., and G. F. Leonard. 18 Nov 60, 14p. (Rept. no. TO-B 60-52)
(Contract AF 33(600)35190)
Unclassified report

DESCRIPTORS: *Data processing systems, *Programming, Coding, Digital computers.

AD-288 970 Div. 30
(TISTP/JW) OTS price $1.10

Aerospace Information Div., Washington, D. C.
QUALITY OF SOVIET PUBLICATIONS IN SCIENCE AND TECHNOLOGY.
11 June 62, 3p. (AID rept. no. 62-78; Trans. from Petrov, G. Science operators and their promoters. Pravda, 4p. 23 May 62)
Unclassified report

DESCRIPTORS: *Research program administration, Bibliography, USSR.

AD-288 981 Div. 30
(TISTP/JW) OTS price $2.60

Florida State U., Tallahassee.
AN INSPECTION ROUTINE IN QUEUEING THEORY,
by Vincent Hodgson. June 62, 30p. (Technical rept. no. 4)
(Contract Nonr-98808, Proj. NR 042-004)
Unclassified report

DESCRIPTORS: *Quality control, *Statistical analysis, Control systems, Test methods.

AD-289 029 Div. 30
(TISTP/GRW) OTS price $1.10

Aerospace Information Div., Washington, D. C.
PROGRESS IN CYBERNETICS.
8 Nov 62, 3p. 5 refs. (AID rept. 62-186)
Unclassified report

DESCRIPTORS: *Cybernetics, USSR, Conferences.

AD-289 277 Div. 30, 32
(TISTB/LMH) OTS price $1.60

National Institutes of Health, Bethesda, Md.
DESIGN OF LABORATORY FACILITIES. A CLASSIFIED LIST OF SELECTED REFERENCES, 1947-1962,
comp. by Gertrude Fox. 1962, 15p. refs.
Unclassified report

DESCRIPTORS: *Bibliography, *Laboratories, *Medical laboratories, Electronics laboratories, Radiochemistry laboratories, Public health, Air conditioning equipment, Construction.

The references listed in this compilation were obtained by searching the following sources: (1) Applied Science & Technology Index, 1958-1962; (2) Architectural Index, 1959-1962; (3) Cumulative Book Index, 1953-1962; (4) Engineering Index, 1959-1961; (5) Index Medicus, 1960-1962; (6) Library of Congress Books - Subjects - Catalog, 1955-1961; (7) National Institutes of Health Library; (8) National Labrary of Medicine Printed Subject Catalog, 1955-1959; and (9) Research Facilities Planning Branch Library. In the preparation of this list of references, an attempt was made to cover all aspects of laboratory design, including planning, landscaping, office design, and equipment. Emphasis has been placed on the most recent information on the design of health-related research facilities. (Author)

AD-289 283 Div. 30
(TISTP/WH) OTS price $4.60

Rocketdyne, Canoga Park, Calif.
STATISTICAL DESIGN OF COMPLEX EXPERIMENTAL PROGRAMS. I. OPTIMUM EXPERIMENTAL DESIGNS OBTAINED BY MINIMIZING A LOSS FUNCTION.
Interim technical rept. on Mathematical Techniques of Aeromechanics,
by Kenneth W. Last. July 62, 41p. incl. table, 6 refs.
(Contract AF 33(616)7372, Proj. 7071)
(ARL 62-373, pt. 1) Unclassified report

DESCRIPTORS: *Analysis of variance, *Test facilities, *Statistical analysis, *Matrix algebra, *Partial differential equations, *Polynomials, *Least squares method, Test methods, Statistical data.

A loss function balancing the value of information against the cost of experimentation is presented for the case of the m variable linear

regression model when experimental costs are a function of the point at which the experiment is performed. Solutions in certain special cases are presented. (Author)

AD-289 310 Div. 30, 12
(TISTP/WH) OTS price $1.60

Illinois U., Urbana.
A USEFUL EXTENSION OF THE NYQUIST CRITERION TO STABILITY ANALYSIS OF MULTILOOP FEED BACK AMPLIFIERS,
by B. R. Myers. 1959, 18p. incl. illus. table, 3 refs.
(Contract AF 49(638)63)
Unclassified report

Proceedings of the 4th Midwest Symposium on Circuit Theory Marquette University, Milwaukee, Wis. pp. J1-J12 December 1959.

DESCRIPTORS: *Feedback amplifiers, *Stability, Algebraic topology.

Several well-known methods are available for examining system stability when at most one parameter in the system is allowed to vary, as for instance the variation in the active parameter in a single-loop feedback amplifier. Of such methods, Nyquist's criterion gives perhaps the most comprehensive information about the stability. When several parameters are allowed to vary simultaneously, however, as is the case with the several active parameters in a multiloop feedback amplifier, there is no such comprehensive method available. A simple graphical solution to the problem is presented which might be regarded as an extension of the Nyquist criterion in that the behavior of the characteristic equation of the system is examined along the radian frequency axis in the s-plane. The method involves plotting only a finite number of Nyquist diagrams; a system with n variable parameters requires at most (2 to the nth power-1) separate Nyquist plots, and in many practical cases less than half of this number are sufficient. (Author)

AD-289 312 Div. 30, 15
(TISTP/WH) OTS price $2.60

Illinois U., Urbana.
THE SYNTHESIS OF MODELS FOR TIME-VARYING LINEAR SYSTEMS,
by J. B. Cruz, Jr. and M. E. Van Valkenburg. 1960, 27p. incl. illus. 20 refs.
(Contract AF 49(638)63)
Unclassified report

Proceedings of the Symposium on Active Network and Feedback Systems, Polytechnic Institute of Brooklyn, Vol. X, pp. 527-544, April 1960.

DESCRIPTORS: *Control systems, *Feedback, *Linear systems, *Analog systems, Simulation.

An adaptive control system is discussed in which the optimum dynamic performance of the system is simulated on a low-power analog called the reference model. The system is required to behave like the reference model as closely as possible. The synthesis of the reference model which is assumed to be linear but time varying is treated. (Author)

AD-289 416 Div. 30, 15
(TISTP/JW) OTS price $1.60

Quartermaster Corps, Washington, D. C.
HISTORY OF THE OPERATIONAL MATHEMATICS OFFICE.
Final rept. no. 10, June 58-June 62,
by Donald J. Poorbaugh. June 62, 14p.
Unclassified report

DESCRIPTORS: *Research program administration, *Mathematics, Applied mathematics.

AD-289 423 Div. 30, 15
(TISTP/JW) OTS price $1.10

North Carolina State Coll., Raleigh.
APPLICATION OF ANALOG AND DIGITAL COMPUTER TECHNIQUES IN THE MATHEMATICAL ANALYSIS OF NONLINEAR DIFFERENTIAL EQUATIONS.
Final rept., 13 June 58-15 July 62,
by Raimond A. Struble. 31 July 62, 4p.
(Contract DA 36-034-ORD-2733, Proj. TB2-0001)
(AROD rept. no. 2125:25)
Unclassified report

DESCRIPTORS: *Computers, *Nonlinear differential equations, Mathematical analysis, Digital computers, Analog computers.

AD-289 448 Div. 30
(TISTP/WH) OTS price $2.60

Bureau of Reclamation, Denver, Colo.
ABSTRACTS OF ELECTRONIC COMPUTER PROGRAMS DEVELOPED BY BUREAU OF RECLAMATION.
Oct 59, 26p.
Unclassified report

DESCRIPTORS: *Data processing systems, *Digital computers, *Programming.

AD-289 512 Div. 30
(TISTB/LMH) OTS price $3.60

System Development Corp., Santa Monica, Calif.
AN EMPIRICAL STUDY OF MINIMAL STORAGE SORTING,
by Thomas N. Hibbard. 22 Oct 62, 31p. incl. illus. 9 refs. (Rept. no. SP-982)
Unclassified report

DESCRIPTORS: *Data storage systems, Data processing system, Scheduling, Sampling, Probability, Mathematical analysis, Mathematical prediction, Distribution, Distribution theory.

An experimental examination of internal sorting with restricted storage is presented by studying four basically different programs operating on three types of random input. Both distributive and comparative classes are used to sort. Programs in the distributive class are presented which tend to be much more sensitive to the

distribution of magnitudes than to order, and the comparative programs are insensitive to the distribution of magnitudes. The four programs are given. For data which are known to be badly distributed, a significant amount of time can be gained by using a comparative technique instead of a digital one. (Author)

AD-289 514 Div. 30
(TISTP/GRW) OTS price $2.60

System Development Corp., Santa Monica, Calif.
INFORMATION INTERFACES AND THE ANALYTICAL DISCRIPTION OF REPORTS,
by James R. Crawford. 31 Oct 62, 24p. (Technical memo. no. TM-785/000/00)
Unclassified report

DESCRIPTORS: *Punched card methods, *Documentation, *Data processing systems, Information retrieval, Reports, Coding.

A system is described to define the reports and the data base for administrative data processing. This system uses a general notation for the contents of forms, punch cards, data files and reports. The format is regular, permitting intermediate analyses by electronic accounting machine methods. The rules for designing reports are simple enough to permit the necessary analytical expressions to be formulated for reports by people skilled only in the use of information. A knowledge of EAM or computer methods is an incidental requirement. The intent, method, and theory for recording the interfaces for an information system is given. (Author)

AD-289 527 Div. 30, 15
(TISTP/GRW) OTS price $3.60

California U., Berkeley.
OPTIMAL AUTOMATIC CONTROL FOR NONLINEAR PROCESSES,
by Lawrence Markus. July 61, 31p. incl. illus. 7 refs. (Technical rept. no. 1)
(Contract Nonr-22288, Proj. NR 041-255)
Unclassified report

DESCRIPTORS: *Control systems, *Nonlinear systems, Differential equations, Synthesis, Automatic.

Notes on automatic control are presented. The topics covered existence of optimal controls, domains of controllability, extremal and relay properties of optimal controllers, and syntheses of optimal controllers. (Author)

AD-289 553 Div. 30
(TISTB/SAT) OTS price $1.60

Biological Labs., Frederick, Md.
PROGRAMMED MAINTENANCE AT FORT DETRICK,
by Cassius M. Inman. Nov 62, 10p. (Technical manuscript 27)
Unclassified report

DESCRIPTORS: *Maintenance, *Management engineering, Data processing systems, Production, Operation, Programming.

The design and implementation of an engineered maintenance program in accordance with acceptable engineering standards are described. The need for such programming is evidenced by the increasing complexity of the modern plant and the resulting enormity of the maintenance budget. Standard procedural practices, estimated time allowances, and the use of electronic data processing machines are discussed. (Author)

AD-289 555 Div. 30, 26
(TISTM/BRW) OTS price $7.60

Oklahoma State U. School of Chemical Engineering, Stillwater.
NONDESTRUCTIVE TESTING.
Final rept.
1961, 73p. incl. illus. tables, refs.
(Contract AF 34(601)5470)
Unclassified report

DESCRIPTORS: *Materials, Welds, Radiography, Penetration, Sound, Vibration, Ultrasonics, Magnetic fields, Non destructive testing.

Contents:
Radiographic testing: Gamma radiography of flash welds
Penetrant tests: Fluorescent penetrants
Sonic testing: Sonic and vibration testing
Selected literature survey: Penetrant testing, sonic testing, magnetic particle testing, eddy currents in nondestructive testing, ultrasonics in nondestructive testing, radiology
Reports on discussion of nondestructive testing by both ultrasonic and radiographic techniques

31. SHIPS AND MARINE EQUIPMENT

AD-288 118 Div. 31
(TISTW/PCR) OTS price $6.60

Hydronautics, Inc., Rockville, Md.
ANALYSIS OF THE BULBOUS BOW ON SIMPLE SHIPS,
by B. Yim. Aug 62, 57p. incl. illus. tables, 21 refs. (Technical rept. no. 117-1)
(Contract Nonr-334900, Proj. no. 062-266)
Unclassified report

DESCRIPTORS: *Ship hulls, *Ships, Equations, Theory, Water waves, Mathematical analysis, Hydrodynamics.

The mathematical expression of the wave resistance of a conventional ship is extremely complicated. Except for the special cases of very low or very high Froude numbers it is necessary to integrate a highly oscillating function numerically. And it is extremely difficult to investigate the effect of varying parameters in the wave resistance equation. Therefore, only simple models of ships are considered in the present paper. The advantages of this procedure are: (1) we can analyze not only the wave resistance but also the effect of the size and the location of the bulb; (2) we need not be concerned about the effect of linearizing the boundary condition on the ship surface; and (3) we can investigate the fundamental relationship between the source and doublet under the free surface. (Author)

AD-288 119 Div. 31, 25
(TISTP/JW) OTS price $3.60

Hydronautics, Inc., Rockville, Md.
ON SHIPS WITH ZERO WAVE RESISTANCE,
by B. Yim. Aug 62, 29p. incl. illus. 9 refs.
(Technical rept. no. 117-2)
(Contract Nonr 334900, Proj. NR 062-266)
Unclassified report

DESCRIPTORS: *Ship hulls, *Ocean waves, Resistance, Design, Fluid flow, Velocity, Wave characteristics.

Takahei (1960) studied the waveless bow and Kumano (1960) investigated the waveless stern. They tried to match the amplitude function of a doublet, which is a function of the doublet strength and the Froude number, as close as possible with the amplitude function of a ship. However, it was not clear whether there even existed a doublet distribution whose amplitude is exactly the same as that of the ship. It is shown in this report that such a doublet distribution can indeed be found but that it extends along a line from the free surface to infinite depth. However, this need not be a serious restriction since it will be shown that the effect of discarding that part of the doublet distribution extending from some finite depth to infinity can be made very small. With such a doublet distribution at the bow and stern the waves from the bow and stern of the given symmetric ship may be completely canceled and the ideal fluid wave resistance of the ship becomes zero. (Author)

AD-288 227 Div. 31
(TISTW/RD) OTS price $2.00

Naval Research Lab., Washington, D. C.
SUBMARINE-RESCUE VHF/UHF RADIO TRANSMITTING BUOY. ELECTRICAL AND RADIO DESIGN CONSIDERATIONS,
by J. Awramik, Jr. 15 Oct 62, 74p. incl. illus. tables, 11 refs. (NRL rept. no. 5820)
Unclassified report

DESCRIPTORS: *Rescue beacons, *Distress signals, *Submarines, *Launching, *Air-sea rescue beacons, Very high frequency, Ultra high frequency, Air-sea rescues, Radio transmitter, Radio transmission, Underwater.

A radio rescue buoy has been developed which can be easily launched from a submerged submarine in distress. The buoy floats to the surface and automatiacally transmits a radio distress signal on a frequency of 243 mc. Use of radio direction-finding techniques permits location of the buoy; this serves to localized the area in which rescue operations can be initiated. Electrical and radio design features have been considered relative to the limitations imposed by requirements for simple ejection, automatic operation, stable flotation, water tightness at deep submergence, long shelf life, long operating life, reliability after long stowage, minimum maintenance, and ease of manufacture in quantity procurement. (Author)

AD-288 242 Div. 31, 17
(TISTB/MS) OTS price $5.60

Woods Hole Oceanographic Institution, Mass.
STRENGTH OF THE ''ALUMINAUT'' HULL.
Technical rept.,
by Joseph B. Walsh. Apr 62, 59p. incl. illus. tables, 24 refs. (Ref. no. 62-32; rept. no. TM-DS-6)
(Contract Nonr-348400, Proj. NR-261-140)
Unclassified report

DESCRIPTORS: *Submarine hulls, *Submarine models, Mechanical properties, Stresses, Failure (Mechanics), Design, Mathematical analysis, Deformation, Fatigue (Mechanics), Aluminum.

Theoretical analysis is carried out to determine the extent of yielding in the hull at the test depth of 17,000 ft., the collapse depth for the shell yield mode and the life of the hull in fatigue. The calculations predict yielding at the fillet if the aluminum just meets the specified yield strength at 0.2% offset of 60,000 psi. The collapse depth for shell yield failure and for 60,000 psi yield strength aluminum is predicted to be between 22,000 ft. and 24,000 ft. Fatigue based on the fillet stresses is not considered a problem if adequate protection against corrosion is maintained as the allowable number of dives to 15,000 ft. is predicted to be well in excess of 20,000. In light of approximations made in the analysis and uncertainty in the yield strength of the actual material, it is recommended that the theoretical results be confirmed by model tests and compression tests on specimens taken from the ALUMINAUT cylinders. Recent model experiments indicate that failure takes place in the plastic general instability mode instead of the shell yield mode predicted by the designers. Consequently, further theoretical calculations are also required. (Author)

AD-288 277 Div. 31, 15
(TISTB/LMH) OTS price $1.60

David Taylor Model Basin, Washington, D. C.
THE IMPULSE RESPONSE FUNCTION AND SHIP MOTIONS,
by W. E. Cummins. Oct 62, 11p. incl. illus. tables, 10 refs. (Rept. no. 1661)
Unclassified report

Presented at the Symposium on Ship Theory, 25-27 January 1962, at the Institut fur Schiffbau der Universitat, Hamburg.

DESCRIPTORS: *Ships, *Motion, *Equations, Hydrodynamics, Mathematical analysis, Oscillation, Stresses, Statistical distributions.

After a review of the deficiencies of the usual equations of motion for an oscillating ship, two new representations are given. One makes use of the impulse response function and depends only upon the system being linear. The response is given as a convolution integral over the past history of the exciting force with the impulse response function appearing as the kernel. The second representation is based upon a hydrodynamic study, and new forms for the equations of motion are exhibited. The equations resemble the usual equations, with the addition of convolution integrals over the past history of the velocity. However, the coefficients in these new equations are independent of frequency, as are the kernel functions in the convolution integrals. Both representations are quite general and apply to transient motions as well as periodic. The relations between the two representations are given. The treatment considers six degrees of freedom, with linear coupling between the various modes. (Author)

AD-288 281 Div. 31, 13
(TISTW/PCR) OTS price $1.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
IMPACT-REDUCTION METHOD FOR SIDE-LAUNCHING PONTOON STRUCTURES.
Final rept.,
by J. E. Smith. 4 Oct 62, 21p. incl. illus. tables (Technical rept. no. R 215)
Unclassified report

DESCRIPTORS: *Floats, *Vibration isolators, Launching, Deceleration, Test equipment, Design, Impact shock, Fiberboard.

When pontoon structures are side-launched from LST's, the high impacts cause damage to the structures, resulting in excessive maintenance and replacement costs. An investigation was

conducted at the U. S. Naval Civil Engineering Laboratory to determine if impacts and resultant damage could be reduced with a cushioning material. An expendable fibreboard cushion was designed, and procedures for assembling and attaching it were developed. Impacts and apparent damage to the pontoon structure were reduced to acceptable levels in tests. Operational testing by the field forces is recommended for full evaluation. (Author)

AD-288 294 Div. 31
(TISTP/FR) OTS price $1.60

David Taylor Model Basin, Washington, D. C.
OPEN-WATER AND CAVITATION PERFORMANCE OF THE PROPELLER FOR AOE-1.
Test and evaluation rept.,
by W. H. Roundy. Oct 62, 14p. incl. illus. 2 refs. (Rept. no. 1670)
Unclassified report

DESCRIPTORS: *Marine propellers, Tests, Cavitation, Thrust, Torque.

Test results are given for the predicted cavitation performance in uniform inflow of the propeller designed for AOE-1. These results are shown as inception curves of face, back, and tip vortex cavitation at each design radius of the propeller. Open-water and cavitation characteristic curves are also included. (Author)

AD-288 539 Div. 31, 17
(TISTW/RD) OTS price $9.10

Committee on Ship Structure, National Research Council, Washington, D. C.
(No title).
Annual rept.
1 May 62, 109p. incl. illus. tables, refs.
Unclassified report

DESCRIPTORS: *Ship hulls, *Ships, Fracture (Mechanics), Steel, Metallurgy, Fatigue (Mechanics), Stresses, Welding, Ship plates, Quality control.

AD-288 655 Div. 31
(TISTB/LMH) OTS price $3.60

Institute of Engineering Research, U. of Calif., Berkeley.
ON THE NORMAL MODES OF NONLINEAR COUPLED SHIP MOTIONS AND THEIR STABILITY,
by W. D. Kinney. Aug 62, 30p. incl. illus. 6 refs. (Series no. 173, Issue no. 5)
(Contract Nonr-22275, Proj. S-R009 01 01)
Unclassified report

DESCRIPTORS: *Ships, *Motion, Stability, Vibration, Oscillation, Differential equations, Transformations (Mathematics), Hydrodynamics, Ocean waves, Damping, Mathematical analysis.

The concept of normal oscillations of a nonlinear conservative system is introduced and applied to the ship motion problem. In addition the stability of these normal modes is investigated and found to depend in general on the same parameters given in previous investigations. Since the normal oscillations represent a combined motion in the degrees of freedom concerned, an unstable mode does not necessarily imply unbounded motion in any one of the degrees of freedom. Since the system is assumed to be conservative, all displacements are necessarily finite. A knowledge of those straight normal modes which are stable is important since it is reasonable to conclude that the motion of ships in calm water will take place near those normal modes. In the absence of damping, the system is conservative, and hence the total energy of the system is a constant. This implies that all displacements and velocities must be finite. Because damping is always present, the system must ultimately reach a stable equilibrium position since energy is constantly dissipated from the system. (Author)

AD-288 660 Div. 31
(TISTP/AW) OTS price $4.60

David Taylor Model Basin, Washington, D. C.
THRUST DEDUCTION DUE TO A PROPELLER BEHIND A HYDROFOIL,
by John L. Beveridge. Oct 62, 36p. incl. illus. tables, 14 refs. (Rept. no. 1603)
Unclassified report

DESCRIPTORS: *Hydrofoil boats, *Marine propellers, *Thrust, *Marine engineering, Wake, Model basins, Mathematical analysis, Configuration.

A method which is based on Lagally's theorem is presented for computing the resistance augmentation, or thrust deduction, for submerged hydrofoil-propeller arrangements. The effect on the magnitude of thrust deduction of foil lift, propeller load, foil span, foil flap angle, and propeller-foil spacing was investigated. Computed examples and experimental thrust-deduction results for several hypothetical arrangements showed good agreement. (Author)

AD-288 661 Div. 31
(TISTP/AW) OTS price $2.60

David Taylor Model Basin, Washington, D. C.
THE EXCITING FORCES AND WETTING OF SHIPS IN WAVES (Vozmushchayushchie Sili i Zalivaemost Sudov na Volnenii),
by M. D. Haskind, tr. by J. N. Newman. Nov 62, 24p. incl. illus. 21 refs. (Trans. no. 307 from Izvestia Akademii Nauk SSSR Otdelenie Tekhnicheskikh Nauk, No. 7, pp 65-79, 1957)
Unclassified report

DESCRIPTORS: *Hydrodynamics, *Water waves, *Ship hulls, Mathematical analysis, Functions, Equations, Motion, Surfaces, Cylindrical Bodies, Oscillation, Diffraction.

General formulas are established for the exciting forces and moments acting on a ship in arbitrary waves. It is shown that for the diffraction of waves due to isolated singularities, such as sources, dipoles, pressure points, etc., the exciting forces and moments depend only on the ship's radiation functions, which characterize the wave radiation in a heavy fluid due to forced oscillations of the ship with unit velocity amplitude in calm water. In the case of diffraction of regular progressive wave systems, it is shown that the exciting forces and moments, the damping coefficients, and the estimated wetting of ships in waves can all be expressed in terms of the asymptotic characteristics of the radiation functions. The general results obtained are employed to calculate the exciting forces and moments in specific examples. (Author)

AD-288 759 Div. 31
(TISTM/ODN) OTS price $2.60

Committee on Ship Structure, National Research Council, Washington, D. C.
SOME REFLECTIONS OF A STRUCTURAL ENGINEER RE-

GARDING RESEARCH PROBLEMS IN SHIP STRUCTURAL DESIGN,
by C. E. Massonnet. 13 Aug 62, 18p.
Unclassified report

DESCRIPTORS: *Ships, *Ship hulls, Materials, Mechanical properties, Stresses, Bolts, Fatigue (Mechanics), Bibliography.

AD-288 805 Div. 31
(TISTP/AW) OTS price $5.60

David Taylor Model Basin, Washington, D. C.
HYDROELASTIC STUDY OF A SHIP EQUIPPED WITH AN ANTIPITCHING FIN,
by Kazuo M. Ochi. Oct 62, 57p. incl. illus. tables, 27 refs. (Rept. no. 1455)
Unclassified report

Paper presented at Annual Meeting of Society of Naval Architects and Marine Engineers, New York, 16-17 Nov 61.

DESCRIPTORS: *Pitch, *Marine engineering, *Ship hulls, *Fins, Vibration, Model basins, Configuration.

The seaworthiness characteristics and induced vibrations of a ship equipped with an antipitching fin were determined. The mechanism of occurrence and the fundamental properties of the induced vibrations are examined from the hydroelasticity viewpoint. Effect of location, size, and configuration of an antipitching fin on ship motions and the induced vibrations are discussed. The study consisted of tests on 5.5-ft and 22-ft Mariner models equipped with fins. The majority of the tests were carried out in regular waves; however, tests in irregular waves were also conducted for a specific ship speed. A fin having holes of proper size and shape was found to be beneficial both for pitch and vibration reduction. (Author)

AD-289 403 Div. 31
(TISTM/ODN) OTS price $2.60

Bureau of Naval Weapons, Navy Dept., Washington, D. C.
BRIEF HISTORICAL REVIEW OF THE HYDROFOIL BOAT,
by H. O. Hollenberg. Aug 60, 22p. (Rept. no. RRSY-60-53)
Unclassified report

DESCRIPTORS: *Hydrofoil boats, *History, Hydrodynamics.

32. MISCELLANEOUS ARTS AND SCIENCES

AD-287 945 Div. 32
(TISTP/FR) OTS price $14.00

Computation Lab., Harvard U., Cambridge, Mass.
INFORMATION STORAGE AND RETRIEVAL,
by Gerard Salton. 1 Sep 62, 1v. incl. illus. tables, 3 refs. (Scientific rept. no. ISR-2)
(Contract AF 19(604)8509, Proj. nos. 5632 and 5633)
(AFCRL 62-572) Unclassified report

DESCRIPTORS: *Information retrieval, *Abstracting, Vocabulary, Language.

Contents:
A computer experiment for sentence extraction
Report on a syntactic analysis program for information retrieval
The use of citations as an aid to automatic content analysis
A critical comparison of some typical data retrieving systems
An evaluation of storage allocation systems

AD-288 051 Div. 32
(TISTP/LMH) OTS price $8.60

Aerospace Information Div., Washington, D. C.
FUTURE TRENDS IN SOVIET SCIENCE AND TECHNOLOGY.
Rept. no. 2, 1 Aug-15 Sep 62.
24 Oct 62, 87p. incl. illus. (AID rept. no. 62-178)
Unclassified report

DESCRIPTORS: *Scientific research, *Scientific reports, *USSR, Astrophysics, Biology, Cybernetics, Earth, Electronics, Metallic compounds, Materials, Plasma physics, Space flight, Meteorology.

Contents:
General information and related sciences
Astrophysics
Biology
Cybernetics
Earth sciences
Electronics
Metallic materials
Nonmetallic materials
Plasma
Scientific administration, organization and education
Space flight and science

AD-288 087 Div. 32
(TISTB/LMH) OTS price $8.60

Documentation, Inc., Bethesda, Md.
INDEXER CONSISTENCY UNDER MINIMAL CONDITIONS,
by J. Jacoby and V. Slamecka. Nov 62, 1v. incl. illus. tables.
(Contract AF 30(602)2616, Proj. 4594)
(RADC TDR 62-426) Unclassified report

DESCRIPTORS: *Indexes, *Coding, *Classification, *Documentation indexing, Vocabulary, Selection, Analysis, Analysis of variance, Reliability, Statistical analysis.

In a project of improving the quality of library indexing, a measure of the consistency with which indexers tend to choose the same terms as being descriptive of the same documents was assessed. Under artificial indexing conditions which excluded the use of indexing tools, communication, and post-indexing editing, six indexers (three experienced, three beginners) using a Uniterm system of coordinate indexing were found to differ significantly in the number of terms used to index a group of 75 randomly selected chemical patents, as well as in the percent of matched terms any one indexer had with any other. The experienced indexers have attained a significantly higher degree of inter-indexer consistency, with less internal variation, than their inexperienced colleagues. Results of the intra-indexer reliability experiment show that, on the whole, each indexer tends to be consistent with himself when re-indexing ''equated'' documents and using a vocabulary of ''general'' (shared) terms. (Author)

Division 32 - MISCELLANEOUS ARTS AND SCIENCES

AD-288 133 Div. 32
(TISTP/FR) OTS price $8.60

RAND Corp., Santa Monica, Calif.
HIGH FREQUENCY WORDS AND OCCURRENCE FORMS IN RUSSIAN PHYSICS,
by A. S. Kozak. Oct 62, 89p. (Research memo. no. RM-3383-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Vocabulary, Physics, Textbooks, USSR, Statistical analysis, Frequency.

The 1000 highest-frequency words and the 1000 highest-frequency occurrence forms of 265,417 running words of Russian are given. Each list is arranged in descending order of frequency of occurrence, and in alphabetical order. Cummulative frequencies and percentage of text covered are shown with each entry. (Author)

AD-288 182 Div. 32
(TISTB/SAT) OTS price $6.60

Naval Radiological Defense Lab., San Francisco, Calif.
AN INDEX TO U. S. NAVAL RADIOLOGICAL DEFENSE LABORATORY TECHNICAL REPORTS (TR SERIES) ISSUED FROM 1 JULY 1960 THROUGH 30 JUNE 1961,
comp. by Elizabeth Budd. 18 May 62, 69p. (Rept. no. NRDL-470)
Unclassified report

DESCRIPTORS: *Bibliography, Radiological contamination, Radiation effects, Radiation injuries, Nuclear propulsion, Nuclear weapons, Particulate filters, Uranium.

AD-288 293 Div. 32, 30
(TISTB/CCH) OTS price $.50

Armed Services Technical Information Agency, Arlington, Va.
DOCUMENTATION. AN ASTIA REPORT BIBLIOGRAPHY (SUPPLEMENT),
comp. by Charlotte C. Hutton. Nov 62, 1v. 110 refs. (Rept. no. ARB-3133; Suppl. to AD-267 000)
Unclassified report

DESCRIPTORS: *Bibliography, *Documentation, *Information retrieval, Machine translation, Speech transmission, Speech representation, Libraries.

This bibliography was prepared by ASTIA as a supplement to AD-267 000 in response to frequent requests for information concerning scientific documentation and related topics. Citations are included for documents cataloged by ASTIA from 1 January 1962 through 15 November 1962. Entries covering the subjects of linquistics, lexicography, mechanical and machine translation, speech analysis and synthesis, and speech compression have been included because of their potential relevance to documentation.

AD-288 420 Div. 32
(TISTB/CCH) OTS price $4.60

California U., Los Angeles.
SOME NOTES ON OLIGOPOLY THEORY AND EXPERIMENTS,
by David H. Stern. 31 May 62, 48p. (Working paper no. 11; Research rept. no. 75)
Unclassified report

DESCRIPTORS: *Economic conditions, *Games theory, *Economics.

AD-288 433 Div. 32
(TISTB/CCH) OTS price $10.50

Applied Mathematics and Statistics Lab., Stanford U., Calif.
LIFETIME CONSUMER ALLOCATION UNDER CERTAINTY AND UNCERTAINTY,
by Menahem E. Yaari. 1 Aug 62, 136p. (Technical rept. no. 120)
(Contract Nonr-22550, Proj. NR 047-004)
Unclassified report

DESCRIPTORS: *Economics, *Economic conditions, Mathematical prediction, Games theory.

AD-288 583 Div. 32, 30
(TISTB/MS) OTS price $1.10

System Development Corp., Santa Monica, Calif.
ON THE VERY GENERAL CHARACTER OF EQUILIBRIUM SYSTEMS,
by Thomas A. Cowan. 18 July 62, 7p. (Rept. no. SP-892)
Unclassified report

DESCRIPTORS: *Scientific research, *Information theory, *Communication systems, *Mathematical logic, Theory, Feedback.

Equilibrium systems (E-Systems) as generalization of linear and feed-back systems are considered. Examples of E-Systems are presented and acausality, logic and simulation are discussed. (Author)

AD-288 799 Div. 32
(TISTM/ODN) OTS price $5.60

Naval Ordnance Test Station, China Lake, Calif.
SELECTED OFFICIAL PUBLICATIONS. PROFESSIONAL PAPERS. PATENTS. 1961.
May 62, 66p. (NOTS TP 2818)
Unclassified report

DESCRIPTORS: *Reports, *Bibliography, *Scientific reports, Patents, Indexes, Documentation, Abstracting.

AD-288 835 Div. 32, 30
(TISTB/AW) OTS price $1.10

System Development Corp., Santa Monica, Calif.
EVALUATING THE EFFECTIVENESS OF INFORMATION RETRIEVAL SYSTEMS,
by Harold Borko. 2 Aug 62, 8p. incl. illus. 7 refs. (Rept. no. SP-909/000/00)
Unclassified report

DESCRIPTORS: *Information retrieval, Sampling, Indexes, Documentation, Effectiveness.

Suggested methods for evaluating the effectiveness of information storage and retrieval systems are: user satisfaction, relative comparison of one system with another, and comparison of a system against an ideal or absolute standard. For purposes of evaluation, a document retrieval system is conceptualized as a problem in sampling statistics where one must select from a store of documents that set which would provide a response to a search question so as to maximize the amount of relevant material and minimize the amount of irrelevant material retrieved. Results of three experiments comparing the effectiveness of different indexing systems are reported along with two studies evaluating retrieval effectiveness by means of computer simulation models. (Author)

AD-288 838 Div. 32
(TISTB/AW) OTS price $1.60

System Development Corp., Santa Monica, Calif.
DETERMINING USER REQUIREMENTS FOR AN INFORMATION STORAGE AND RETRIEVAL SYSTEM: A SYSTEMS APPROACH,
by Harold Borko. 4 Oct 62, 11p. 9 refs.
(Rept. no. SP-973)
Unclassified report

DESCRIPTORS: *Information retrieval, *Information theory, Effectiveness, Analysis.

The determination of user requirements for information is viewed as a systems problem in which the needs of the individual user of information must be considered in context of the total system in which he operates. It is suggested that instead of studying types of users, more progress would be made by examining the different categories of information usage which vary from a search for a specific document to a search for new and stimulating research ideas. The methods for investigating requirements for information are the methods of scientific observation: field studies, case studies, surveys, and experimentation. These methods are briefly described, illustrated by example, and the advantages and disadvantages indicated. Throughout, the systems approach is emphasized. (Author)

AD-289 001 Div. 32
(TISTB/LMH) OTS price $15.00

Office of Aerospace Research, Washington, D. C.
RESEARCH RESULTS, JULY-SEPTEMBER 1962.
1962, 1v. (Rept. no. OAR-R2)
Unclassified report

DESCRIPTORS: *Bibliography, *Scientific reports, *Indexes, Aeronautics, Electronics, Geophysics, Engineering, Biology, Mathematics, Physics, Chemistry, Air force research.

AD-289 006 Div. 32
(TISTB/MS) OTS price $1.60

RAND Corp., Santa Monica, Calif.
EXCAVATION OF THE WUPATKI BLOWHOLE SITE, NA7824,
by R. A. Schley. Nov 62, 13p. incl. illus. 8 refs. (Memo. no. RM-3266-RC, Suppl. to RM-3139-RC, AD-276 935)
Unclassified report

DESCRIPTORS: *Archaeology, Ecology, Geological time, Anthropology, Anthropological data.

Excavation of the Wupatki Blowholé site revealed four occupation areas within a 120-m area. Ceramics, petroglyphs, masonry, and other evidence suggest a twelfth-century occupancy. That the nearby blowholes affected the inhabitant's choice of sites seems unquestionable, but further excavations should be undertaken, both to clarify this point, and to gain a variety of ecological and geochronological data. (Author)

AD-289 550 Div. 32/3
(TISIP/EHH) OTS price $5.00

Armed Services Technical Information Agency, Arlington, Va.
USSR RESEARCH REPORTS. AN ASTIA REPORT BIBLIOGRAPHY.
Bibliography for 1952-1962,
comp. by Elizabethe H. Hall. 30 Oct 62, 1v. 2,149 refs.
Unclassified report

DESCRIPTORS: *Communism, *Communists, *Military government, *Foreign policy, *Propaganda, *Bibliography, *Economic conditions, *USSR, *Warfare, *Military intelligence, *Military communication, Public relations, Public opinion, Political science, Military research, Industrial relations, Industrial mobilization, Reports, Logistics, Operations research, National defense, Leadership, Military personnel, Symposia, Personnel, Military operations, Economics, Literature, Aerodynamics, Chemistry, Physics, Transportation, Social sciences, Conferences, Machine translation, Radiological warfare, Nuclear propulsion, Guided missiles, Industrial production.

This bibliography is a listing of translated USSR research reports and English material catalogued by ASTIA from 1952 through 1962. The 2,149 references cited herein cover a wide range of subject areas corresponding to the 33 divisions in the ASTIA Distribution Guide. Part I refers to translated material, whereas Part II refers to English material of USSR Research Reports and is restricted to unclassified, unlimited references. Within each subject area, reports prepared by Department of Defense contractors are listed alphabetically by source, contract and title; military reports are arranged by source and title. The classified and unclassified limited references of this bibliography appear as a separate volume.

AD-289 558 Div. 32, 15
(TISTP/WH) OTS price $10.50

Princeton U., N. J.
AN APPROACH TO A GENERAL THEORY OF PRIORITIES: AN OUTLINE OF PROBLEMS AND METHODS.
Report on Econometric Research Program,
by W. Giles Mellon. 30 July 62, 133p. incl. illus. tables, refs. (Research memo. no. 42)
(Contract Nonr 185816)
Unclassified report

DESCRIPTORS: *Economics, *Military procurement, *Linear programming, *Games theory, *Logistics, Matrix algebra, Groups (Mathematics).

This analysis concerns itself specifically with the illustration of how measures of military worth (priorities) can be developed and applied to particular military decision problems. While this discussion is confined to problems related to military decision, it is hoped that the reader can see how much of the discussion is applicable to other economic situations as well. (Author)

33. TRANSPORTATION

AD-288 720 Div. 33
(TISTM/TCG) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A DEVICE FOR TRANSPORTING LARGE-SIZE STRUCTURAL COMPONENTS,
by N. N. Shchekin. 19 July 62, 5p. (Trans. no. FTD-TT-62-756 from Soviet Patent No. 139942 (688664/29), 12 Dec 60)
Unclassified report

DESCRIPTORS: *Transportation, *Structures, *Loading, Hydraulic systems, Pneumatic devices.

Division 33 - TRANSPORTATION

AD-288 779 Div. 33
(TISTM/ODN) OTS price $1.60

Politecnico di Torino (Italy).
FIRST INTERNATIONAL CONFERENCE ON THE MECHANICS OF SOIL-VEHICLE SYSTEMS.
Final technical rept., 1 Oct 60-30 Apr 62.
30 Apr 62, 15p.
(Contract DA 91-591-EUC-1545)
Unclassified report

DESCRIPTORS: *Symposia, *Vehicles, Abstracting, Reports, Bibliography, Soils.

AD-288 792 Div. 33, 11
(TISTW/RD) OTS price $4.60

Army Transportation Board, Fort Eustis, Va.
NODWELL CARRIER RN 110. PHASE III: TROPICAL EVALUATION.
Rept. of evaluation.
June 62, 43p.
(Proj. TCB-61-047-EV)
Unclassified report

DESCRIPTORS: *Vehicles, *Tracked vehicles, *Cargo vehicles, Terrain, Canada, Jungles, Tropical regions.

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

*Descriptors marked with an asterik are included in the subject index.

ASTRONOMY

NASA N62-17976 $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. SCIENTIFIC EXPERIMENTS FOR RANGER 3, 4, AND 5. Rept. on Contract NAS7-100. 1 Oct 62, 29p. 10 refs. Technical rept. no. 32-199 (Revised).

Astrophysics

NASA N63-10509 $4.60

Astrophysical Observatory, Smithsonian Institution, Cambridge, Mass.
CATALOG OF PRECISELY REDUCED OBSERVATIONS NO. P-5, by Jean E. MacDonald and Katherine Haramundanis. Rept. on Grant NsG-87-60. 27 Aug 62, 45p. 4 refs. SAO Special rept. 102.

NASA N63-10508 $4.60

Astrophysical Observatory, Smithsonian Institution, Cambridge, Mass.
SATELLITE ORBITAL DATA, by I. G. Izsak. Rept. on Grant NsG-87-60. 28 Aug 62, 48p. SAO Special rept. no. 103.

NASA N62-16682 $2.60

Geophysics Corp. of America, Bedford, Mass.
PLANETARY AERONOMY II: NO_2 IN THE MARTIAN ATMOSPHERE, by P. Warneck, and F. F. Marmo. Rept. on Contract NASw-395. May 62, 21p. 10 refs. GCA Technical rept. no. 62-5-N.

NASA N62-16683 $4.60

Geophysics Corp. of America, Bedford, Mass.
PLANETARY AERONOMY III: DETERMINATION OF ATMOSPHERIC PARAMETERS BY THE USE OF ROCKET-BORNE MASS SPECTROMETERS, by R. F. K. Herzog, F. F. Marmo and others. Rept. on Contract NASw-395. July 62, 41p. 15 refs. GCA Technica rept. no. 62-2-N.

NASA N62-16684 $1.60

Geophysics Corp. of America, Bedford, Mass.
PLANETARY AERONOMY IV: THE DUOPLASMATRON AS A VACUUM ULTRAVIOLET LIGHT SOURCE, by J. A. R. Samson and H. J. Liebl. Rept. on Contract NASw-395. Aug 62, 19p. 8 refs. GCA Technical rept. no. 62-8-N.

NASA N62-16685 $5.60

Geophysics Corp. of America, Bedford, Mass.
PLANETARY AERONOMY V: VACUUM ULTRAVIOLET LIGHT SOURCES, by J. A. R. Samson. Rept. on Contract NASw-395. Aug 62, 57p. 34 refs. GCA Technical rept. no. 62-9-N.

BEHAVIORAL SCIENCES

AD-262 911 $2.60

Georgetown U. Medical [Center] Washington, D. C.
A CROSS-VALIDATION OF THE PROVERBIAL ATTITUDES TEST AND THE PSYCHODYNAMICS UNDERLYING THE PROVERBS IDENTIFYING THE CHARACTER AND PERSONALITY DISORDERS, by John H. Rohrer. Rept. on Contract Nonr-1530(07). Aug 61, 29p. 2 refs.

DESCRIPTORS: *Personality tests, Naval personnel, Reaction (Psychology), *Attitudes, Tests, Test methods.

One section of this report presents the underlying psychodynamic characteristics of individuals who received diagnoses of personality and character disorders as revealed by analyses of the dynamics of the test items. The second part deals with a cross-validation of the forms themselves

PB 162 348 $1.10

[Space Sciences Lab.] General Electric Co., Philadelphia, Pa.
THE ROLE OF HUMAN FACTORS IN WHITE ROOM MANUFACTURING RELIABILITY, by Edward I. Gavurin. 20 June 62, 9p. 3 refs. Document no. 62SD590.

DESCRIPTORS: *Controlled atmospheres, Manufacturing methods, Reliability, *Human engineering, Personnel, Behavior, *Attitudes, Training, Personality tests.

It is important to recognize that the overall reliability of equipment is not only a function of the components of which it is comprised but also of the individuals who produce it. Consequently, increasing the reliability of the production workers' performance will also increase the reliability of the finished product. This paper is concerned with the role which human performance plays in white room manufacturing reliability and the techniques for optimizing this performance within a controlled environmental work setting. Consideration has been given to the effect of selection, training, motivation and morale, and the special requirements for glove-handed operations upon the reliability of the white room workers. (Author)

Biochemistry

TID-12706 $2.60

Argonne National Lab., Ill.
INTERCELLULAR TRANSFER OF FORSSMAN HEMOLYSINS DURING THE COURSE OF INITIAL AND SECONDARY IMMUNIZATIONS AND AFTER SEPARATION BY STARCH ELECTROPHORESIS, by William H. Taliaferro and Lucy Graves Taliaferro. [Rept. on Contract W31-109-eng-38] Mar 61, 24p. 9 refs.

BNL-5354 $3.60

Brookhaven National Lab., Upton, N. Y.
KYNURENINE-4-C^{14}, ORTHO-AMINO-ACETOPHENONE-2-C^{14}, ANTHRANILIC ACID-1-C^{14} AND CARBOXYl-C^{14} -ANTHRANILIC ACID SYNTHESIS AND METABOLISM, by L. V. Hankes. [1961] 37p. 37 refs.

TID-16978 $4.60

Institute of Agriculture, U. of Minnesota, St. Paul
THE BIOCHEMISTRY OF A NEW SULFUR MUSTAR, S-(DICHLOROVINYL)-L-CYSTEINE AND ITS RELATION TO APLASTIC ANEMIA, by M. O. Schultze and J. H. Sautter. Final and Summary rept. 1 Oct 55-30 Sep 62, on Contract AT(11-1)-364. 1 Oct 62, 50p. 30 refs.

BNL-5364 $1.60

South Nassau Communities Hospital, Oceanside, N. Y.
SERUM BINDING OF B_{12} ANALOGUES: IDENTIFICATION OF BINDING GROUPS IN THE B_{12}-MOLECULE, by L. M. Meyer, P. G. Reizenstein, and H. P. Cronkite. 15p. 12 refs. Prepared in cooperation with Brookhaven National Lab., Upton, N. Y.

General Biology

UCRL-9495 $2.60

Lawrence Radiation Lab., U. of California, Berkeley.
GENETIC INFLUENCES ON MATING BEHAVIOR IN DROSOPHILA MELANOGASTER, by Philip E. Hildreth and Gweneth Carson Becker. Rept. on Contract W-7405-eng-48. 6 Dec 60, 27p. 9 refs.

UCRL-9284 $3.60

Lawrence Radiation Lab., U. of California, Berkeley.
QUANTITATIVE ASPECTS OF MATING BEHAVIOR IN DROSOPHILA, by Philip E. Hildreth. Rept. on Contract W-7405-eng-48. 24 June 60, 33p. 20 refs.

Radiobiology

UWFL-52(Rev.) $1.10

Applied Fisheries Lab., U. of Washington, Seattle
A METHOD FOR THE DETERMINATION OF STRONTIUM-90 IN BIOLOGICAL MATERIALS, by Toshiharu Kawabata and Edward E. Held. Rept. on Contract AT(45-1)-540. 2 Jan 58, 10p. 7 refs.

ANL-6535 $2.75

Argonne National Lab., Tenn.
BIOLOGICAL AND MEDICAL RESEARCH DIVISION, Semiannual rept., July-Dec 61, on Contract W-31-109-eng-38. Apr 62, 169p. 74 refs.

TID-3910 $1.00

Atomic Energy Commission. Div. of Biology and Medicine, Washington, D. C.
TERRESTRIAL AND FRESHWATER RADIOECOLOGY: A SELECTED BIBLIOGRAPHY, by Alfred W. Klement, Jr., and Vincent Schultz. Mar 62, 81p.

BNL-5176 $1.10

Brookhaven National Lab., Upton, N. Y.
APPLICATION OF WHOLE-BODY GAMMA SPECTROMETRY AND COMPUTER ANALYSIS TO CLINICAL TRACER STUDIES, by Stanton H. Cohn. [1961] 2p.

BNL-5089 $1.60

Brookhaven National Lab., Upton, N. Y.
ATOMIC RADIATION AND CROP IMPROVEMENT, by Seymour Shapiro. [1960] 17p.

BNL-5039 $1.10

Brookhaven National Lab., Upton, N. Y.
COMMENTS ON THE CONFERENCE WITH RESPECT TO ADVANCES IN THE FUNDAMENTAL ASPECTS OF PLANT AND SEED RADIOBIOLOGY, by Arnold H. Sparrow. [1960] 8p.

BNL-4795 $1.60

Brookhaven National Lab., Upton, N. Y.
NEUTRON SPECTROSCOPY APPLIED TO THE BROOKHAVEN MEDICAL RESEARCH REACTOR, by Charles G. Amato. [1960] 13p. 10 refs.

HW-SA-2660 $1.60

Hanford Atomic Products Operation, Richland, Wash.
DELAYED EFFECTS IN RATS OF CHRONIC YTTRIUM-90 INGESTION, by M. F. Sullivan, S. Marks, and R. C. Thompson. Rept. on Contract AT(45-1)-1350. Aug 62, 13p. 7 refs.

HW-SA-2718 $2.60

Hanford Atomic Products Operation, Richland, Wash.
RADIOACTIVITY IN ALASKAN ESKIMOS, by H. E. Palmer, W. C. Hanson and others. Rept. on Contract AT(45-1)-1350. 17 Aug 62, 22p. 8 refs.

HW-SA-2731 $1.10

Hanford [Atomic Products] Operation, Richland, Wash.
SOME COMMENTS ON THE ANALYSIS OF THE VARIABILITY IN BLOOD CONSTITUENTS, by Carl A. Bennett. Rept. on Contract AT(45-1)-1350. 20 Aug 62, 10p. 1 ref.

HW-SA-2614 $1.60

Hanford Atomic Products Operation, Richland, Wash.
STUDIES WITH NEPTUNIUM IN THE RAT, by John E. Ballou, William J. Bair and others. Rept. on Contract AT(45-1)-1350. 22 June 62, 11p.

HW-SA-2686 $1.10

Hanford [Atomic Products Operation] Richland, Wash.
X-RAY EFFECTS ON SINGLE AND MIXED SPECIES POPULATIONS OF TRIBOLIUM CONFUSUM AND TRIBOLIUM CASTANEUM (COLEOPTERA: TENEBRIONIDAE), by H. E. Erdman. Rept. on Contract AT(45-1)-1350. Aug 62, 8p.

LADC-5323 $1.60

Los Alamos Scientific Lab., N. Mex.
LONGEVITY OF FIRST AND SECOND GENERATION OFFSPRING FROM MALE MICE EXPOSED TO FISSION NEUTRONS AND GAMMA RAYS, by J. F. Spalding. [Rept. on Contract W7405-eng-36]. 12 Sep 62, 13p. 3 refs.

LADC-5310 $1.60

Los Alamos Scientific Lab., N. Mex.
RADIATION EXPOSURE TO PEOPLE FROM NUCLEAR WEAPON TESTS THROUGH 1961, by W. H. Langham and E. C. Anderson. [Rept. on Contract W7405-eng-36]. 21 Aug 62, 20p. 21 refs.

ORO-565 $4.60

Methodist Hospital, Houston, Texas.
A NEW CLINICAL PROCEDURE FOR LOCALIZATION OF BRAIN TUMORS, by Herbert C. Allen, Jr. Jan 58, 48p.

TID-16458 $10.50

Radiobiology Lab., U. of Utah, Salt Lake City.
ANNUAL PROGRESS REPORT. Rept. on Contract AT(11-1)-119. 31 Mar 56, 139p. 15 refs.

TID-16569 $2.60

Wayne State U. Coll. of Medicine, Detroit, Mich.
FINAL TECHNICAL REPORT. Rept. for 1 July 54-30 Nov 59, on Contract AT(11-1)-307. [1962] 30p. 16 refs.

TID-17017 $1.60

Western Reserve U., Cleveland, Ohio.
STUDIES ON THE COMBINED EFFECT OF ACTINOMYCIN D AND X-RADIATION, by Ernest L. Schoeniger, Paul R. Salerno, and Hymer L. Friedell. Rept. on Contract W-31-109-eng-78. [1961] 14p. 7 refs.

CHEMISTRY

BNL-6231 $1.10

Brookhaven National Lab., Upton, N. Y.
CHEMISTRY OF ANHYDROUS SYSTEMS CONTAINING HYDROGEN FLUORIDE AND NITROGEN OXIDES, by Frederick L. Horn, Charles B. Bartlett, and Richard J. Tivers. 30 July 62, 10p. 11 refs.

RFP-265 $1.60

Dow Chemical Co., Denver, Colo.
THE USE OF NUCLEAR POISONS FOR CRITICALITY CONTROL IN CHEMICAL PROCESSING, by C. L. Schuske. Rept. on Contract AT(29-1)-1106. 14 Mar 62, 19p. 3 refs.

HW-74609 $3.60

Hanford Atomic Products Operation, Richland, Wash.
LOADING AND ELUTION CHARACTERISTICS OF SOME NATURAL AND SYNTHETIC ZEOLITES, by L. L. Ames, Jr. and K. C. Knoll. Rept. on Contract AT(45-1)-1350. 10 Aug 62, 38p. 14 refs.

HW-SA-2581 $2.60

Hanford Atomic Products Operation, Richland, Wash.
RECOVERY AND PURIFICATION OF TECHNETIUM-99 FROM NEUTRALIZED PUREX WASTES, by F. P. Roberts, F. M. Smith, and E. J. Wheelwright. Rept. on Contract AT(45-1)-1350. 9 May 62, 21p. 7 refs.

HW-SA-1936 $1.60

Hanford Atomic Products Operation, Richland, Wash.
THE SALT CYCLE PROCESS, by G. E. Benedict, W. L. Lyon and others. Rept. on Contract AT(45-1)-1350. 13p.

IS-232 $4.60

Institute for Atomic Research, Iowa State U. of Science and Tech., Ames.
BISMUTH, by James S. Fritz. [1960] 48p. 107 refs.

UCRL-10397 $2.50

Lawrence Radiation Lab., U. of California, Berkeley.
A METHOD FOR ESTIMATING THE HEAT OF FORMATION AND FREE ENERGY OF FORMATION OF INORGANIC COMPOUNDS, by Darrell E. Wilcox. Master's thesis. Rept. on Contract W-7405-eng-48. 1 Aug 62, 123p. 90 refs. NASA N62-16449.

UCRL-10352 $2.50

Lawrence Radiation Lab., U. of California, Berkeley
SEARCH FOR UNSTABLE INTERMEDIATES IN THE CARBOXYLATION REACTION OF PHOTOSYNTHESIS (PART I). SOME REACTIONS OF DIAZOMETHANE IN AQUEOUS SOLUTION (PART II). by George Agapios Akoyunoglou. Rept. on Contract W-7405-eng-48. Aug 62 140p. 38 refs.

K-1267 $1.60

Oak Ridge Gaseous Diffusion Plant, Tenn.
HIGH PRESSURE FLUORINATION OF URANIUM OXIDES, by R. E. Greene and G. S. Petit. Rept. on Contract W-7405-eng-26. 25 Aug 60, 15p. 4 refs.

K-1418 $2.60

Oak Ridge Gaseous Diffusion Plant, Tenn.
THE URANIUM HEXAFLUORIDE-HYDROGEN FLUORIDE FREEZING POINT CURVE AND ITS APPLICATION TO A METHOD OF ANALYSIS, by R. J. Wertz and W. D. Hedge. Rept. on Contract W-7405-eng-26. 13 Aug 60, 23p. 6 refs.

K-1448 $2.60

Oak Ridge Gaseous Diffusion Plant, Tenn.
THE VAPOR PRESSURE OF URANIUM PENTAFLUORIDE IN THE SOLID AND LIQUID STATES, by Alexander S. Wolf, J. C. Posey, and Karl E. Rapp. Rept. on Contract W-7405-eng-26. 5 Sep 60, 21p. 13 refs.

Analytical Chemistry

HW-26499(Del.) $3.60

Hanford Atomic Products Operation, Richland, Wash.
X-RAY PHOTOMETRIC ASSAY OF PLUTONIUM IN METAL CASTINGS, by M. C. Lambert. Rept. on Contract W-31-109-eng-52. 12 Dec 52, declassified. 33p. 10 refs.

PB 162 578 $1.60

Nepa Div., Fairchild Engine and Airplane Corp., Oak Ridge, Tenn.
THE SPECTROCHEMICAL ANALYSIS OF BISMUTH MATRICES EMPLOYING THE POROUS ELECTRODE TECHNIQUE, by J. C. Delaney and L. E. Owen. 12 May 50, 19p. 2 refs. NEPA 1424-SCR-59.

DESCRIPTORS: *Bismuth, Bismuth alloys, *Lead alloys, Eutectics, Chemical analysis, Spectroscopy, Beryllium, Cobalt, Chromium, Iron, Manganese, Molybdenum, Niobium, Nickel, Tantalum, Titanium, Vanadium, Tungsten, Electrodes, Porous materials.

A spectrochemical procedure for the analysis of Be, Co, Cr, Fe, Mn, Mo, Nb, Ni, Ta, Ti, V, and W in bismuth matrices is described. The technique developed calls for the excitation of solutions representing the dissolved sample and an added internal standard element. The experimental work justifying the procedure is detailed. (Author)

Physical Chemistry

IS-247 $1.60

Ames Lab., Iowa State U. of Science and Tech.
TERNARY COMPOUNDS BETWEEN THORIUM MONOCARBIDE AND THORIUM DIHYDRIDE, by D. T. Peterson and J. Rexer. [1959] 15p. 7 refs.

DRI-2042 $3.60

Denver Research Inst., Colo.
INTERMEDIATE-TEMPERATURE OXIDATION OF BERYLLIDES. Quarterly progress rept. 1 Mar-1 June 62, on Contract AT(11-1)-1092. 1 June 62, 35p. 5 refs.

UCRL-6316 $5.60

Lawrence Radiation Lab., U. of California, Livermore.
THE DEVELOPMENT OF THE KINETIC THEORY OF GASES. VI. VISCOSITY, by Stephen G. Bruch. Rept. on Contract W-7405-eng-48. 25 Jan 61, 51p. 66 refs.

UCRL-9615 $1.60

Lawrence Radiation Lab., U. of California, Berkeley.
HYDRIDES OF GERMANIUM, TIN, ARSENIC AND ANTIMONY, by William L. Jolly and John E. Drake. Rept. on Contract W-7405-eng-48. Mar 61, 15p. 21 refs.

TID-17011 $1.60

National Bureau of Standards, Washington, D. C.
NOBLE GAS SOLUBILITY AND DIFFUSION IN UO_2. Summary rept. 30 June 61-31 Aug 62, on Contract AT(49-2)-1165. 5 Oct 62, 19p. 17 refs.

PB 153 850 $1.60

Plastics Lab., Princeton U., N. J.
STUDIES ON THE ELECTRONIC ACTIVITY OF METAL ATOMS IN METALLOCENE SYSTEMS, by D. S. Trifan and R. Bacskai. Rept. on Contract DA 36-039-sc-78105. 15 Dec 60, 11p. 12 refs. Technical rept. 60A; AD-248 980.

DESCRIPTORS: *Metal organic compounds, *Ferrocenes, Embedding substances, Chemical bonds, Electrons, *Chemical reactions, Stereochemistry, Carbon, Ions, Iron, Atoms.

This report includes:
Metal-hydrogen bonding in metallocene compounds, pub. in the Jnl. of the American Chemical Society 82:5010-5011, 1960
The role of iron in carbonium ion reactions of ferrocene derivatives, pub. in Tetrahedron Letters no. 13:1-8, 1960

PB 162 354 $1.60

Politecnico di Milano (Italy).
RESEARCHES ON HYDROGEN OVERVOLTAGE ON METALLIC SINGLE CRYSTALS; CADMIUM, by L. Peraldo Bicelli, A. La Vecchia, and N. Sala Cataffo. Rept. for June 59-July 60, on Surface and Interface Phenomena of Matter, Contract AF 61(052)144. Feb 61, 19p. 11 refs. WADD Technical note 60-269.

DESCRIPTORS: *Electrochemistry, Electrodes, Single crystals, *Metallic crystals, *Cadmium, Voltage, Measurement, Electrolytes, *Perchloric acid, Temperature, Crystal structure, Ion exchange, Reaction kinetics.

Hydrogen overvoltage on cadmium polycrystalline and single crystal cathodes, oriented following the (0001), (1010) and (1120) planes, has been measured in perchloric acid solutions. The tafel law holds; the parameters being different for the different electrodes. (Author)

PWAC-376 $0.75

Pratt and Whitney Aircraft Div., United Aircraft Corp., Middletown, Conn.
THE ELECTRICAL RESISTIVITY OF SODIUM, POTASSIUM, RUBIDIUM AND CESIUM IN THE LIQUID STATE. Rept. on Contract AT(30-1)-2789. 30 June 62, 29p. 7 refs. NASA N62-15308.

NYO-9138 $1.50

Tracerlab, Richmond, Calif.
DEVELOPMENT OF A CATION EXCHANGE RESIN WITH SCINTILLATING PROPERTIES, by Alvin H. Heimbuch and Harry Y. Gee. Rept. on Contract AT(30-1)-2525. Apr 62, 63p. 20 refs. NASA N62-15939.

TID-12409 $1.60

Argonne National Lab., Ill.
WEATHER MODIFICATION, by M. B. Rodin and D. C. Hess. [Rept. on Contract W31-109-eng-38]. 20 Feb 61, 4p. 1 ref.

NASA N63-10510 $2.60

Astrophysical Observatory, Smithsonian Institution, Cambridge, Mass.
NUMERICAL RESULTS FROM ORBITS, by Yoshihide Kozai. Rept. on Grant NsG-87-60. 31 July 62, 24p. 18 refs. SAO Special rept. 101.

PNE-130F $3.00

Geological Survey, Washington, D. C.
HYDROLOGIC AND GEOLOGIC STUDIES FOR PROJECT GNOME. Progress rept. May 62, issued 25 Sep 62. 195p. 25 refs.

Mineralogy

UCRL-6419 $1.60

Lawrence Radiation Lab., U. of California, Livermore.
THE HUGONIOT EQUATION-OF-STATE OF GRANITE, by David B. Lombard and Frank L. Adelman. Rept. on Contract W-7405-eng-48. June 61, 14p.

MITS-48 $1.25

Massachusetts Inst. of Tech., Cambridge.
THE ADAPTATION OF NEW RESEARCH TECHNIQUES TO MINERAL ENGINEERING PROBLEMS. Semiannual progress rept. for period ending 30 Apr 62 on Contract AT(30-1)-956, Sep 62, 48p., NYO-9203.

Oceanography

TID-16534 $1.10

Bermuda Biological Station, St. George's West.
THE BIOCHEMICAL CIRCULATION OF ELEMENTS IN THE SARGASSO SEA, by John H. Ryther and David W. Menzel. Progress rept. 1 Sep 61-30 Nov 62, on Contract AT(30-1)-2646. 1 Sep 62, 10p. 18 refs.

PB 162 351 $9.10

Woods Hole Oceanographic Institution, Mass.
BIBLIOGRAPHY OF REPORTS, 1950-1960. Jan 61, 101p. 832 refs. Reference nos. 60-53.

DESCRIPTORS: *Bibliography, Scientific reports, *Oceanography, Marine meteorology, Marine biology.

Reports are listed chronologically with an author index.

NYO-2310 $3.60

Woods Hole Oceanographic Institution, Mass.
PHYSICS OF THE OCEAN, by Arnold Arons and Bruce B. Benson. Rept. on Contract AT(30-1)-1794. July 58, 36p. 14 refs. Ref. no. 58-48.

Seismology

PNE-150F $1.50

Coast and Geodetic Survey, Washington, D. C.
SEISMIC WAVES FROM AN UNDERGROUND EXPLOSION IN A SALT BED, by D. S. Carder, W. K. Cloud and others. Rept. on Proj. GNOME, Contract AT (29-2)746. Aug 62, issued 27 Sep 62. 60p.

NASA N62-16649 $11.50

Lamont Geological Observatory, Columbia U., Palisades, N. Y.
DESIGN AND CONSTRUCTION OF A LUNAR SEISMOGRAPH PROTOTYPE MODEL, by M. Ewing. Final technical rept. on Contract NASw-82. 27 June 62, 160p.

ENGINEERING

NAA-SR-MEMO-4965 $7.60

Atomics International, Canoga Park, Calif.
ANALYSIS OF GR-3,000 KW MODEL EVAPORATOR AND SUPERHEATER TRANSIENTS, by D. Fletchall. 10 Mar 60, 59p. 12 refs.

HW-73994 $1.60

Hanford Atomic Products Operation, Richland, Wash.
A WELL WATER TEMPERATURE LOGGING SYSTEM, by J. R. Raymond. Rept. on Contract AT(45-1)-1350. 5 June 62, 13p.

Aeronautical Engineering

AD-273 094 $3.60

Aviation Crash Injury Research, Phoenix, Ariz.
CRASH INJURY INVESTIGATION: U. S. ARMY H-21C VERTOL SHAWNEE HELICOPTER, TOBYHANNA, PENNSYLVANIA, 23 AUGUST 1961, by Gerrit J. Walhout, Daniel J. Schneider, and Lloyd E. Spencer. Rept. on Contract DA 44-177-tc-707. Sep 61, 37p. 4 refs. Rept. no. AvCIR 61-11; NASA N62-10198; TREC Technical rept. 61-134.

DESCRIPTORS: *Helicopters, *Aviation accidents, Aviation injuries, Analysis, Aviation personnel, *Pilots, Human engineering, Cockpits, *Aircraft seats, Safety harness, Hazards, Helmets.

A U. S. Army H-21C "Shawnee" helicopter crashed in a heavily wooded area ten miles northwest of Tobyhanna, Pennsylvania. It was found that the pilot-seat attachments failed near the connecting points. The copilot-seat attachments failed at two points, but the seat and occupant remained in place. The investigation also revealed that the crew chief, seated near the rear cargo door, remained strapped to his seat but received minor contusions due to his being thrown against a litter support bracket and being struck by a chock block that had not been properly secured.

AD-274 905 $4.60

Aviation Crash Injury Research, Phoenix, Ariz.
CRASH INJURY INVESTIGATION: U. S. ARMY HU-1A BELL IROQUOIS HELICOPTER ACCIDENT, FORT CARSON, COLORADO, 10 AUGUST 1961, by Gerard M. Bruggink, Daniel Schneider, and Lloyd E. Spencer. Rept. on Contract DA 44-177-tc-707. Sep 61, 50p. 5 refs. Rept. no. AvCIR 61-13; TREC Technical rept. 62-10.

DESCRIPTORS: *Aviation accidents, *Helicopters, Analysis, Aviation safety, Pilot seats, Safety belts, Safety harness, Castings, Failure.

A U. S. Army HU-1A Bell helicopter crashed in mountainous terrain, approximately 10 miles NW of Colorado Springs, Colorado. Although the accident is considered nonsurvivable with respect to the impact conditions and the resulting cabin/cockpit destruction, the investigation revealed a significant trend in the failures of the cast structures in the crew and passenger restraint systems. As a result of this investigation, it is recommended that the use of cast structures in occupant restraint systems be discontinued. (Author)

AD-266 410 $2.60

Aviation Crash Injury Research, Phoenix, Ariz.
FACTOR ANALYSIS OF LIGHTPLANE ACCIDENT IMPACT AND DAMAGE VARIABLES, by Lee W. Gregg (Carnegie Inst. of Tech.) and Richard G. Pearson. Rept. on Contract DA 44-177-tc-707. Aug 61, 22p. 3 refs. Rept. no. AvCIR-61-6; TREC Technical rept. 61-122.

DESCRIPTORS: *Factor analysis, *Aviation accidents, Aviation injuries, Impact shock, Liaison planes.

A conceptual framework through which accident variables are defined and certain cause-and-effect relationships are established is confirmed through application of the technique of factor analysis to a set of lightplane accident data. Relationships between aircraft structural damage and injury to the occupant were seen to increase as a function of proximity. Individual measures of the consequences of impact were found to intercorrelate higher than the implied cause-effect relations from impact to damage. (Author)

AD-265 868 $1.60

Aviation Crash Injury Research, Phoenix, Ariz.
LIMITS OF SEAT-BELT PROTECTION DURING CRASH DECELERATION, by Gerard M. Bruggink and Daniel J. Schneider. Rept. on Contract DA 44-177-tc-707. Sep 61, 18p. 20 refs. Rept. no. AvCIR 61-8; TREC Technical rept. 61-115.

DESCRIPTORS: *Safety belts, *Aircraft seats, *Aviation accidents, Deceleration, Effectiveness.

Three cases are reviewed in which aircraft occupants, restrained only by seat belts, received serious or fatal decelerative injuries. The study indicates some of the trauma that may be expected when the tolerable and injurious limits of seat-belt protection are exceeded.

Chemical Engineering

RFP-267 $1.60

Dow Chemical Co., Denver, Colo.
SOME EFFECTS OF CRITICALITY CONTROL ON CHEMICAL ENGINEERING DESIGN, by B. L. Kelchner, C. J. Pinamont and others. Rept. on Contract AT(29-1)-1106. 9 July 62, 17p. 3 refs.

UCRL-10339 $2.00

Lawrence Radiation Lab., U. of California, Berkeley.
DIRECT CONTACT CONDENSATION WITH TWO IMMISCIBLE FLUIDS, by Daryl Lee Lackey. Master's thesis. Rept. on Contract W-7405-eng-48. 29 June 62, 87p. 20 refs. NASA N62-16442.

UCRL-6963-T $1.10

Lawrence Radiation Lab., U. of California, Livermore
PROGRESS ON OPTIMIZATION OF OIL DIFFUSION PUMP SYSTEMS FOR ULTRAHIGH VACUUM IV, by Norman Milleron and Leonard L. Levenson. [Rept. on Contract W7405-eng-48]. 27 Aug 62, 6p. 4 refs.

Electrical and Electronic Engineering

ANL-FGF-353 $1.60

Argonne National Lab., Ill.
A PULSED EDDY CURRENT TEST SYSTEM USING REFLECTED FIELDS, by C. J. Renken. 11 June 62, 14p. 7 refs.

NAA-SR-Memo-7278 $3.60

Atomics International, Canoga Park, Calif.
THE POWER OUTPUT AND EFFICIENCY OF THERMIONIC CONVERTERS CONNECTED IN SERIES AND PARALLEL CIRCUITS. PART I, by J. W. Holland. 10 Apr 62, 36p.

PB 162 365 $10.50

Clevite Corp., Cleveland, Ohio.
PIEZOELECTRIC CERAMIC I-F FILTERS, by D. R. Curran, W. J. Gerber, and A. Lungo. Final rept. 1 Sep 56-31 Jan 58, on Contract DA 36-039-sc-73008. 17 Feb 58, 139p. 3 refs.

DESCRIPTORS: *Intermediate frequency filters, Design, Ceramic materials, Piezoelectric materials, *Band-pass filters.

The development of piezoelectric ceramic I-F filters was carried out in two directions. Piezoelectric ceramic resonators were used as circuit elements in conventional filter networks and as elements in a new filter configuration. Theory for the use of ceramic resonators in conventional ladder filters is presented in some detail along with the design of sample filters. The use of piezoelectric ceramics in an unconventional application was investigated for the double wheel and axle type filter. The design parameters were investigated and the resulting design curves are presented. A number of samples of each type of filter were fabricated, illustrating the range of characteristics available. Data are presented for these samples indicating their general characteristics, temperature stability, and behavior with environmental conditions. (Author)

HW-SA-2148 $1.10

Hanford Atomic Products Operation, Richland, Wash.
WIDE RANGE CURRENT DETECTOR, by W. C. Danister. [Rept. on Contract AT(45-1)1350]. May 61, 10p.

IS-212 $1.10

Institute for Atomic Research, Iowa State U. of Science and Tech., Ames.
AN ELECTRICAL PASS-THROUGH FOR CLEAN, HIGH VACUUM USE, by Don M. Jackson, Garry Wells, and Donald Soseman. [1961] 6p. 1 ref.

NASA N63-10333 $4.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
MOD II RANGING EQUIPMENT, by Harold W. Baugh. Rept. on Contract NAS7-100. 15 Sep 62, 45p. Technical rept. no. 32-337.

AD-265 184 $4.60

Kidde, Walter, and Co., Inc., Belleville, N. J.
STATIC SWITCHING DEVICES, by Richard Gilbert and Norman Riley. Quarterly progress rept. no. 7, 1 May-31 July 61, on Establish Designs for Static "Relay-like" Devices, Contract DA 36-039-sc-85240. [1961] 47p. Rept. no. 2202-Q7.

DESCRIPTORS: *Electronic switches, Electronic relays, *Switching circuits, Electronic circuits, Transistors, Semiconductors, Diodes, Photoelectric materials,

Resistors, Capacitors, Design, Waveform generators, Trigger circuits, Oscillator circuits, Oscillators, Tests.

The improvement and testing of the SPST Task III relay using a single output stage are described. The development and testing of a SPST Task III relay using a 2 transistor Darlington output stage are also discussed. The application of tunnel diodes to a bistable front end for the Task I photoconductor relay is analyzed and the development of a Schmitt trigger front end is presented. Testing of the complete photoconductor relay is also described. (Author) (See also PB 160 042)

UCRL-7071 $2.60

Lawrence Radiation Lab., U. of California, Livermore
LOW-POWER PULSING OF STRAIN GAGES ON PLASTIC MATERIALS, by C. Eugene Makerov. Rept. on Contract W-7405-eng-48. 25 Sep 62, 26p. 11 refs.

UCRL-6958-T $1.60

Lawrence Radiation Lab., U. of California, Livermore.
PERFORMANCE OF A SIX-INCH TRIODE P. I. G. PUMP COMPARED TO A 'PERFECT' PUMP, by Norman Milleron and Finn S. Reinath. [Rept. on Contract W-7405-eng-48]. 23 Aug 62, 12p. 2 refs.

Ordnance, Missiles, and Satellite Vehicles

PB 162 353 $8.10

Boeing Co., Seattle, Wash.
DESIGN STUDY FOR CABIN LIGHTING OF ORBITAL FLIGHT VEHICLES, by Jack E. Shearer and Peter Downey. Final rept. 16 June 59-Feb 60, on Crew Station Design for Non Air Breathing High Performance Flight Vehicles, Contract AF 33(616)6598. Apr 60, 88p. 26 refs. WADD Technical note 60-122; AD-244 316.

DESCRIPTORS: Lighting equipment, *Lighting systems, *Spaceship cabins, Design, *Satellite vehicles, Illumination, Vision, Incandescent lamps, Fluorescence, Human engineering.

The factors involved in the design of a general lighting system for the cabin of a completely enclosed space vehicle are discussed and evaluated. These factors establish the criteria and requirements for a suitable lighting system which may be used in space vehicles required to orbit for prolonged periods (thirty days or longer) without the existence of conventional transparencies. (Author)

NASA N62-17159 $3.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
A RELIABILITY ANALYSIS METHOD FOR COMPLEX SYSTEMS, by D. G. Bourke. Rept. on Contract NAS7-100. 1 Aug 62, 39p. 6 refs. Technical rept. no. 32-316.

NASA N62-17438 $4.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SPACE PROGRAMS SUMMARY NO. 37-17. VOLUME III. DEEP SPACE INSTRUMENTATION FACILITY. Rept. for 1 July-1 Sep 62, on Contract NAS7-100. 1 Oct 62, 47p. 1 ref.

Sanitation and Safety Engineering

WT-1449 $2.50

Ammann and Whitney, New York.
RESPONSE OF DUAL-PURPOSE REINFORCED-CONCRETE MASS SHELTER, by E. Cohen, E. Laing, and A. Bottenhofer. Operation Plumbbob. Apr 61, 133p.

GAMD-3276 $2.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
KRYPTON BACK DIFFUSION THROUGH GRAPHITE CLAD FUEL ELEMENTS, by R. F. Turner and F. E. Vanslager. Rept. on Contract AT(04-3)-314. 16 July 62, 25p. 9 refs.

HW-SA-2623 $1.60

Hanford Atomic Products Operation, Richland, Wash.
DISTRIBUTION OF PARTICLE SIZE FOUND IN BREATHING AIR AT HANFORD PLUTONIUM FABRICATION FACILITIES, by J. M. Selby. Rept. on Contract AT(45-1)1350. 22 June 62, 12p. 4 refs.

JLI-650-9-1 $3.00

Johnston, William H., Labs., Inc., Baltimore, Md.
HIGH DILUTION ON-STREAM ISOTOPIC TRACERS. Annual rept. on Contract AT(11-1)-650. May 61, 206p. 87 refs.

ORNL-TM-354 $1.10

Oak Ridge National Lab., Tenn.
USE OF THE DRY MAINTENANCE FACILITY FOR HRT MAINTENANCE, by J. Paul Jarvis. [Rept. on Contract W7405-eng-26]. 17 Sep 62, 7p. 1 ref.

PB 159 717 $8.10

Pacific Southwest Forest and Range Experiment Station, Berkeley, Calif.
EFFECTS OF MASS FIRES ON PERSONNEL IN SHELTERS, by A. Broido and A. W. McMasters. Rept. on Contract DCM-SR-59-7. Aug 60, 87p. 27 refs. Technical paper 50.

DESCRIPTORS: Nuclear warfare, *Shelters, *Fires, *Personnel, Heat tolerance, Tolerances, (Physiology),

*Heat transfer, Civil defense systems, Poisonous gases, Toxicity, Ventilation.

The objectives of this study were to: (1) determine if critical concentrations of carbon monoxide or toxic gases are present in an area surrounded by fire and in a shelter within such an area; (2) learn if there is an oxygen deficiency in an area surrounded by fire and in a shelter within such an area; (3) determine temperatures to be expected within a shelter in a fire area, especially the transmission of heat through ventilation systems or other openings; and (4) determine size of a cleared area necessary to protect personnel (in shelters) when the area is completely surrounded by fire.

PB 160 849 $5.60

Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio.
IN QUEST OF CLEAN AIR FOR BERLIN, NEW HAMPSHIRE, by Paul A. Kenline. 1962, 54p. 49 refs. Technical rept. SEC TR A62-9; NASA N62-15068.

DESCRIPTORS: *Sanitary engineering, Air, Contamination, *Atmospheric pollution, Waste gases, *New Hampshire.

The major source of air pollution in Berlin is industry, specifically the pulping and auxiliary operations. Pollutants of concern include particulates, sulfur oxides, hydrogen sulfide, and malodorous reduced-sulfur gases. Undesirable effects of pollution include soiling, excessive dustfall, paint damage, vegetation damage, and unpleasant odors. Complete control of pollutant emissions probably cannot be obtained. Although solutions to some of the pollution problems are very difficult and may be economically unwarranted, certain measures can be undertaken that may result in a considerable improvement in pollution emissions; certain measures and evaluations to this effect are presented.

FOOD, HANDLING, AND PACKAGING EQUIPMENT

PB 162 567 $16.00

Advisory Board on Quartermaster Research and Development, National Research Council, Washington, D. C.
FREEZE-DRYING OF FOODS. PROCEEDINGS OF A CONFERENCE, SHORELAND HOTEL, CHICAGO, ILLINOIS APRIL 12-14, 1961, SPONSORED BY QUARTERMASTER FOOD AND CONTAINER INSTITUTE FOR THE ARMED FORCES, QUARTERMASTER RESEARCH AND ENGINEERING COMMAND, U. S. QUARTERMASTER CORPS AND GENERAL COMMITTEE ON FOODS, ADVISORY BOARD ON QUARTERMASTER RESEARCH AND DEVELOPMENT, DIVISION OF ENGINEERING RESEARCH, ed. by Frank R. Fisher. 1962; 249p. 90 refs.

DESCRIPTORS: *Freeze-drying, *Food, *Military rations, *Dehydrated foods, Proteins, *Moisture, Deterioration, Meat, *Distillation models (Simulations), Dielectric properties, *Heat transfer, *Microwaves, Energy, *High frequency, *Temperature control, Plants, *Tissues (Biology), Beef, Instrumentation.

Contents:
Minimizing product damage-basic biochemical and biophysical approaches
Increasing product storage life-basic deteriorative reactions
Ideas for accelerating the freeze-drying process–basic physical and engineering principles
Improved instrumentation for freeze-drying operations-exploring new approaches
Improving product rehydration basic biochemical and biophysical approaches
Conference summation.

MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT

TID-15413 $2.60 PTI

Los Alamos Scientific Lab., N. Mex.
AUTOMOTIVE AIR-GAS TURBINES. A BIBLIOGRAPHY, 1948-1957, comp. by Lois E. Godfrey. Rept. on Contract W-7405-eng-36. 3 Apr 57, 28p.

MATERIALS

NASA N62-12812 $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena
STRUCTURAL AND HIGH-TEMPERATURE TENSILE PROPERTIES OF SPECIAL PITCH-COKE GRAPHITES, by H. E. Martens and W. V. Kotlensky. Rept. on Contract NASw-6. 31 Nov 61, 14p. 8 refs. Technical rept. no. 32-181.

NASA N62-17071 $1.60

Rensselaer Polytechnic Inst., Troy, N. Y.
INTERDISCIPLINARY MATERIALS RESEARCH CENTER, by Stephen E. Wiberley. Semiannual progress rept. 1 Mar-31 Aug 62, on Grant NsG-100-60. 27 Sep 62, 18p.

AD-268 271 $5.60

Resin Research Labs., Inc., Newark, N. J.
HEAT STABLE INHIBITORS FOR DIENE VULCANIZATES, by Gerald A. Baum and Alex Goldberg. Rept. no. 1, on Contract DA 11-070-508-ORD-1200. 1 Nov 61, 55p. 26 refs.

DESCRIPTORS: *Heat resistant polymers, *Oxidation inhibitors, *Dienes, Rubber, *Vulcanizates, Vulcanization, Temperature, Stabilization, Air, Ovens, Aging, Tests, Tensile properties, Hardness, Stresses, Shear stresses, Deformation, Ferrocenes, Formaldehyde, Resorcinol, Amines, Fatty acids, Soaps, Sulfones, Phenols, Synthesis.

The objective of this work was to synthesize chemicals which would function as heat resistant inhibitors for diene vulcanizates. Three distinct chemical classes of materials were synthesized during the past year. These included substituted ferrocene derivatives, substituted resorcinol - formaldehyde derivatives, and polymeric secondary aryl amines. Details describing the synthesis of these chemicals are included. Addition of these materials to SBR rubber followed by vulcanization and heat aging showed the following results: the ferrocene derivatives were inactive as heat stabilizers, the resorcinol-formaldehyde resins adversely affected the curing of vulcanizates and in addition functioned as oxidation promoters rather than inhibitors. The polymeric secondary aryl amines were relatively inactive, however, the polyamine from p-phenylene diamine and p-dichlorobenzene showed inhibition of degradation both alone and when mixed with a fatty acids soap/chelator combination. (Author)

Ceramics and Refractories

BMI-X-170(Del.) $3.60

Battelle Memorial Inst., Columbus, Ohio.
PROPERTIES OF PuO_2 AND PuO_2-ThO_2 CERAMICS, by S. J. Paprocki, D. L. Keller and others. 30 June 61, declassified. 38p. 8 refs.

KAPL-1866 $1.60

Knolls Atomic Power Lab., Schenectady, N. Y.
SILICA-URANIUM FUEL SYSTEMS. II, by W. M. Cashin and W. H. Howland. Rept. on Contract W-31-109 eng-52, 9 Sep 57, 19p. 3 refs.

NASA N62-15757 $2.60

National Beryllia Corp., Haskell, N. J.
RESEARCH ON LOW-DENSITY THERMAL INSULATION MATERIALS FOR USE ABOVE 3000°F, by K. H. Styhr. Quarterly status rept. no. 1, 1 Apr-30 June 62, on Contract NASr-99. [1962] 29p. 20 refs.

GEAP-3743 (Pt. II) $0.50

Vallecitos Atomic Lab., General Electric Co., Pleasanton, Calif.
RADIATION EFFECTS IN BORIDES. PART II. FISSION SINTERING OF BORIDE POWDERS, by E. W. Hoyt and D. L. Zimmerman. Rept. on Contract AT (04-3)189. 15 Feb 62, 18p. 12 refs.

Plastics

HW-61923 $2.60

Hanford Atomic Products Operation, Richland, Wash.
PLASTICS FOR USE IN RADIATION FIELDS. I. EFFECT OF GAMMA RADIATION ON THE PHYSICAL PROPERTIES OF PLASTICS, by Robert Harrington. Rept. on Contract AT(45-1)1350. 20 Jan 61, 25p. 4 refs.

PB 181 462 $0.50

Quartermaster Research and Engineering Command, Natick, Mass.
IRRADIATION "FACTOR-DEPENDENCY": SOME PARAMETERS FOR VINYL MONOMERS. [PRESENTED AT THE] ANNUAL ELECTRON BEAM SYMPOSIUM [NO. 3] BOSTON, MASSACHUSETTS, 23-24 MARCH, 1961 by Ed. F. Degering, C. Merritt, Jr. and others. [1961] 17p. 1 ref.

DESCRIPTORS: *Vinyl radicals, Acetates, Butyrates, Silanes, *Isoprene, *Acrylic resins, *Styrenes, *Electron beams, Radiation effects, Atmosphere, Dosage, Temperature.

The data derived from these studies of the effects of ionizing irradiation, clearly indicate factor dependency with respect to: (1) atmosphere, (2) dose rate, (3) temperature, and (4) the monomer system. There is an indication also of the probable application of the irradiation-parameter concept to the irradiation of other systems. (Author)

MATHEMATICS

AD-258 182 $2.60

Carnegie Inst. of Tech. Graduate School of Industrial Administration, Pittsburgh, Pa.
ESTIMATION OF THE ALLOWANCES FOR DOUBTFUL ACCOUNTS IN RETAIL ESTABLISHMENTS, by R. M. Cyert, H. J. Davidson, and G. L. Thompson. ONR Research memo. no. 81 on Planning and Control of Industrial Operations, Contract Nonr-760(01). [1961] 28p.

DESCRIPTORS: *Applied mathematics, *Management engineering, *Commerce, *Matrix algebra, Probability, Vector analysis.

HW-SA-2067 $1.60

Hanford Atomic Products Operation, Richland, Wash.
EXTENDED USE OF HILL'S INFINITE DETERMINANT, by A. L. Rutz. Rept. on Contract AT(45-1)-1350. 15 Dec 60, 19p. 6 refs.

HW-SA-2038 $1.60

Hanford Atomic Products Operation, Richland, Wash.
EXTENSION OF THE GRAF ADDITION THEOREM FOR BESSEL FUNCTIONS, by A. L. Rutz. Rept. on Contract AT(45-1)-1350. 10 Nov 60, 12p. 3 refs.

HW-SA-2119 $1.10

Hanford Atomic Products Operation, Richland, Wash.
OPTIMUM USE OF SUBGROUPING IN CERTAIN 100% INSPECTION SITUATIONS, by J. L. Jaech. Rept. on Contract AT(45-1)-1350. 7 Mar 61, 10p. 1 ref.

HW-SA-2019 $2.60

Hanford Atomic Products Operation, Richland, Wash.
UNSTABLE CHARACTERISTICS OF A CLASS OF FUNCTIONS DEFINED BY A LINEAR DIFFERENTIAL EQUATION WITH PERIODIC COEFFICIENTS, by Albert L. Ruiz. Rept. on Contract AT(45-1)-1350. 4 Nov 60, 21p. 4 refs.

MSUCP-12 $1.60

Michigan State U., East Lansing.
COMPUTATION OF ELECTRIC FIELD AND POTENTIAL OF AN IDEALIZED DEE GEOMETRY, by J. W. Beal. Rept. on Contract AT(11-1)-872. Oct 61, 18p.

MSUCP-9 $4.60

Michigan State U., East Lansing.
COMPUTATIONAL STUDY OF FACTORS DETERMINING THE OPTICAL CHARACTERISTICS OF A RESONANT EXTRACTION SYSTEM FOR A 3 SECTOR CYCLOTRON, by H. G. Blosser and M. M. Gordon. Rept. on Contract AT(11-1)-872. Jan 61, 44p. 14 refs.

AD-263 920 $1.60

Northwestern Technological Inst., Evanston, Ill.
EXTENSIONS OF A THEOREM BY CLARK, by A. Charnes, W. W. Cooper and G. L. Thompson (Carnegie Inst. of Tech.). ONR Research memo. no. 42 on Temporal Planning and Management Decision under Risk and Uncertainty, Contract Nonr-1228(10), and Planning and Control of Industrial Operations, Contract Nonr-760(01). 10 Aug 61, 16p. 4 refs.

DESCRIPTORS: *Linear programming, Matrix algebra, Theory.

The following theorem is proved: If a linear programming problem (written in inequality form) has a solution, then either the primal constraint set or the dual constraint set is unbounded.

NASA N62-17454 $1.60

Rensselaer Polytechnic Inst., Troy, N. Y.
[AN ADAPTIVE MODEL FOR NONLINEAR PROCESS IDENTIFICATION] by P. M. DeRusso and R. J. Roy. Semiannual status rept. no. 1, 1 Mar-1 Sep 62, on Grant NsG-244-62. Sep 62, 19p. 21 refs.

AD-258 139 $2.60

University of Southern California, Los Angeles.
SCHWARZ'S ALTERNATING METHOD FOR BOUNDARY VALUE PROBLEM OF THE THIRD KIND, by Helmut Werner. Rept. on Contract Nonr-228(09). [1961] 21p. 8 refs.

DESCRIPTORS: *Functional analysis, Partial differential equations, Numerical methods and procedures, Fourier analysis, Potential theory.

This paper is concerned with the numerical investigation of the solution of a mixture of first and third kind boundary value problems of the Laplace equation in domains which are the union of two rectangles.

AD-279 841 $1.10

Washington, U., Seattle
A THEOREM ON MAPS WITH NON-NEGATIVE JACOBIANS, by Albert Nijenhuis and R. W. Richardson, Jr. Technical rept. no. 14 on Contract Nonr-477(15). Feb 62, 9p. 2 refs.

DESCRIPTORS: *Alegbraic topology, *Algebraic geometry, Differential geometry, Complex variables, Conformal mapping.

This note gives an elementary proof of the following theorem: Let M and N be connected, oriented n-dimensional differentiable manifolds of class $C^k (k \geq 1)$ and let $f : M \to N$ be a proper C^k map such that the Jacobian $J(f)$ is non-negative at each point of M. then either $J(f) \equiv 0$ or f maps M onto N.

Computing Devices

AD-271 566 $16.50

Computation Center, Mass. Inst. of Tech., Cambridge
RESEARCH AND EDUCATIONAL ACTIVITIES IN MACHINE COMPUTATION BY THE COOPERATING COLLEGES OF NEW ENGLAND, by Philip M. Morse. Progress rept. no. 9 on Contract Nonr-1841(69) and National Science Foundation [Grant] G-6386. July 61, 252p.

DESCRIPTORS: *Computers, Mathematical computer data, Operation, Training, Programming, Scientific research, *Bibliography, Abstracts.

A great deal of research effort has been devoted to construction, planning, and programming for time-sharing. Other research, notably in problem-solving and in numerical analysis, has been progressing. The use of the Center's facilities in class education has been expanding rapidly. The variety of problems which the Center's facilities have helped to solve are illustrated in the abstracts of active problems. (See also PB 159 348)

PB 157 804-22 $5.60

Digital Systems Lab., Princeton U., N. J.
CANONICAL REGULAR EXPRESSIONS AND MINIMAL STATE GRAPHS FOR DEFINITE EVENTS, by J. A. Brzozowski. Apr 62, 56p. 15 refs. Technical rept. no. 22.

DESCRIPTORS: *Switching circuits, Electrical networks, Circuits, Sequences, *Programming (computers) Computers, *Computer logic

This paper considers the class of sequential circuits which can be realized with unit delays and combinational circuitry, but no feedback loops. In the language of regular expressions, these circuits realize definite events. A theorem is proved that for every definite event there exists a canonical regular expression. An algorithm is presented for obtaining a minimal state graph directly from the canonical form of the regular expression. Methods for testing whether a regular expression is definite are discussed. A procedure is described for converting a regular expression denoting a definite event to the canonical form. It is shown that canonical forms can be found for certain other classes of regular expressions, and minimal state diagrams can be obtained directly from these canonical forms. (Author)

PB 157 804-18 $8.10

Digital Systems Lab., Princeton, N. J.
DERIVATION OF OPTIMUM TESTS TO DETECT FAULTS IN COMBINATIONAL CIRCUITS, by J. F. Poage. Mar 62, 82p. 9 refs. Technical rept. no. 18.

DESCRIPTORS: *Switching circuits, Circuits, *Electrical networks, Computer logic, Reliability, Test methods, Special functions, Algebras.

Permanent component failures or faults within a combinational logic network may cause a network to realize an output function different from that for which it was designed. Boolean algebra, while sufficient to describe the normal operation of a network, gives no indication of the effect that a fault will have upon a network output function. To overcome this deficiency an analysis procedure is developed for combinational logic networks which yields an output expression incorporating network structure in addition to input variables. From this one output expression it is possible to obtain the network output function when any permanent fault, single or multiple, exists within the network.

PB 157 804-23 $3.60

Digital Systems Lab., Princeton U., N. J.
ESSENTIAL MULTIPLE-OUTPUT PRIME IMPLICANTS, by E. J. McCluskey, Jr. and H. Schorr. Apr 62, 37p. 16 refs. Technical rept. no. 23.

DESCRIPTORS: *Switching circuits, Electrical networks, Synthesis, *Special functions, Computer logic, Algebras

In synthesizing minimal two-stage gate networks the most difficult problem is that of selecting which prime implicants should be included in the minimal sums. For single-output networks this problem is simplified if the essential prime implicants are determined. This paper presents a theory of essential prime implicants for multiple-output networks. A theorem is proved which characterizes essential multiple-output prime implicants. The application of this theorem to prime implicant tables and to the direct determination of only the essential prime implicants is presented. (Author)

PB 157 804-16 $4.60

Digital Systems Lab., Princeton U., N. J.
INTRODUCTION TO THE AUTOMATED SYNTHESIS OF COMPUTERS, by Herbert Schorr. Mar 62, 43p. 16 refs. Technical rept. no. 16.

DESCRIPTORS: *Digital computers, Computers, Synthesis, Automation, Operation, Programming (Computers), Equations, Algebras, Digital systems, Design.

A digital computer is designed to execute a set of instructions, each of which is an algorithm consisting of a finite set of procedures. Each step in such an algorithm is called a micro-operation. If a digital computer is viewed as a set of registers interconnected so as to permit specified information transfers between them, then register transfers are fundamental constituents of micro-operations. This report gives a register transfer description of an adder, the adder being regarded as a simple, special purpose computer. Easily programmable algorithms are then employed to translate any register transfer description into an equivalent set of Boolean equations which are the computer design equations. The corresponding computer programs are basic to the automation of computer synthesis via register transfer descriptions. (Author)

PB 157 804-14 $1.60

Digital Systems Lab., Princeton U., N. J.
MINIMUM-STATE SEQUENTIAL CIRCUITS FOR A RESTRICTED CLASS OF INCOMPLETELY SPECIFIED FLOW TABLES, by E. J. McCluskey, Jr. Feb 62, 20p. 5 refs. Technical rept. no. 14.

DESCRIPTORS: Circuits, *Switching circuits, *Programming (Computers), Synthesis, Computers, Electrical networks

This paper is concerned with the problem of obtaining minimum-state sequential circuits for incompletely specified flow tables. Attention is directed to relay-type flow tables in which the only unspecified entries are those which occur because of restrictions on the allowed input-variable changes. For this type of flow table it is shown that a simplified version of the Unger-Paull procedure is sufficient. In particular, only maximum compatibles need be considered in forming the minimum-state sequential circuit. (Author)

PB 157 804-20 $2.60

Digital Systems Lab., Princeton U., N. J.
OBTAINING MINIMUM-STATE COMPRESSED FLOW TABLE, by E. B. Eichelberger. Apr 62, 27p. 7 refs. Technical rept. no. 20.

DESCRIPTORS: Switching circuits, Circuits, *Electrical networks, Synthesis, *Programming (Computers), Computers, Feedback

A compressed flow table has the same general form as a primitive flow table. Each state of a compressed flow table corresponds to a set of states of a primitive flow table, no two of which are stable in the same column. The problem of obtaining a minimum-state compressed

flow table is considered. First, a procedure is given for finding a primitive flow table for which the maximum number of stable states in any one column is minimized. Second, a technique is presented for transforming this primitive flow table into a minimum-state compressed flow table. (Author)

PB 157 804-15 $7.60

Digital Systems Lab., Princeton U., N. J.
PROPERTIES OF REGULAR EXPRESSIONS AND STATE DIAGRAMS, by J. A. Brzozowski. Mar 62, 71p. 20 refs. Technical rept. no. 15.

DESCRIPTORS: *Switching circuits, Circuits, *Programming (Computers), Computers, Sequences

The practical applications of regular expressions have been limited because of inadequate methods for manipulating such expressions to extract the information contained in them, and because the algorithms available for conversion of a regular expression to a state diagram or flow table were rather indirect and lengthy. A new approach, leading to the solution of some of the above problems, is presented.

PB 157 804-17 $6.60

Digital Systems Lab., Princeton U., N. J.
THE SYNTHESIS OF COMBINATIONAL CIRCUITS CONTAINING HAZARDS, by E. B. Eichelberger. Mar 62, 67p. 6 refs. Technical rept. no. 17.

DESCRIPTORS: *Switching circuits, Circuits, Synthesis, Static electricity, Hazards, Electrical networks, Digital systems, Design.

This paper is concerned with the design of combinational (loop-free) switching circuits containing static hazards and delays such that output pulses are produced for certain input level changes. The first part of the paper reviews some of the previous work on static hazards. In the second part some examples are given of networks which yield pulse outputs for input level changes, and the term "controlled hazard" is used to describe this characteristic. Controlled hazards are classified in terms of the input variables, and a general model is proposed for networks containing controlled hazards.

PB 157 804-13 $5.60

Digital Systems Lab., Princeton U., N. J.
TRANSIENT BEHAVIOR OF COMBINATIONAL LOGIC NETWORKS, by E. J. McCluskey, Jr. Jan 62, 55p. 11 refs. Technical rept. no. 13.

DESCRIPTORS: *Electrical networks, Circuits, Synthesis, *Transients, *Computer logic, Algebras, Switching circuits.

It is customary to use Boolean algebra to represent combinational logic circuits. Such a representation is only accurate for steady-state input conditions; i.e., when no inputs are changing. During input changes it is possible for spurious transient outputs, not predicted by the algebra, to occur. The effects of contact stagger in contact networks and spurious delays in gate networks are studied and a rigorous technique for using a modified Boolean algebra to represent contact and gate networks under both steady-state and transient conditions is developed. Theorems are presented which give necessary and sufficient conditions for whether it is possible for a given network to produce spurious transient outputs. Using these theorems, a technique is developed for analyzing a network for the possibility of spurious outputs. (Author)

HW-70893 $1.60

Hanford Atomic Products Operation, Richland, Wash.
A GENERALIZED FORTRAN INPUT ROUTINE, by J. R. Lilley. Rept. on Contract AT(45-1)-1350. 29 Aug 61, 11p.

HW-SA-2155 $1.60

Hanford Atomic Products Operation, Richland, Wash.
PEAK DEMAND DISPLAY SYSTEM, by W. R. Moon. [Rept. on Contract AT(45-1)1350]. May 61, 16p.

HW-SA-1949 $1.10

Hanford Atomic Products Operation, Richland, Wash.
A SIMPLE PROGRAMMER FOR OVEN OR FURNACE CONTROL, by U. L. Upson. Rept. on Contract AT(45-1)-1350. [1960] 5p.

HW-73653(Rev.) $1.60

Hanford Atomic Products Operation, Richland, Wash.
ZERO-DIMENSIONAL ANALYSIS OF SOME PU-AL-H_2O ASSEMBLIES, by P. L. Hofmann and G. J. Busselman. Rept. on Contract AT(45-1)1350. 11 May 62, 16p. 9 refs.

KAPL-M-EC-25 $7.60

Knolls Atomic Power Lab., Schenectady, N. Y.
CURFIT-2: CURVE FITTING PROGRAM, by James A. Warrington. Rept. on Contract W-31-109-eng-52. 6 Aug 62, 72p. 5 refs.

KAPL-M-EC-23 $2.60

Knolls Atomic Power Lab., Schenectady, N. Y.
MIRAGE: MATRIX INTERPRETIVE ROUTINE, by D. G. Dight, F. D. Federighi, and J. A. Warrington. Rept. on Contract W-31-109-eng-52. 25 July 62, 27p. 1 ref.

UCRL-10335 $5.60

Lawrence Radiation Lab., U. of California, Livermore.
PROGRAM FAKE: MONTE CARLO SIMULATION OF BUBBLE CHAMBER EVENTS, by Gerald R. Lynch. Rept. on Contract W-7405-eng-48. 10 July 62, 52p.

LADC-5173 $6.60

Los Alamos Scientific Lab., N. Mex.
THE COLASL AUTOMATIC CODING LANGUAGE, by Karl G. Balke and Glenn L. Carter. [Rept on Contract W7405-eng-36]. 19 Feb 62, 70p. 11 refs.

LADC-4055 $1.60

Los Alamos Scientific Lab., N. Mex.
REACTOR COMPUTING, by Carroll B. Mills. [Rept. on Contract W7405-eng-36]. [1958] 13p. 11 refs.

AD-261 870 $2.60

Massachusetts U., Amherst.
COMPUTER PROGRAMS FOR X-RAY DIFFRACTION DATA PROCESSING, by R. S. Stein, J. Powers and S. Hoshino. ONR Technical rept. no. 33 on Contract [Nonr]-3357(00). 7 July 61, 29p. 5 refs.

DESCRIPTORS: *X-ray diffraction analysis, Data processing systems, Polymers, Films, Digital computers, *Programming (Computers), Corrections, Computers, Intensity.

X-ray diffracted intensity data obtained with a diffractometer from oriented polymer films must be corrected for background, polarization, absorption, and incoherent scattering before being used for quantitative calculations of radial distribution functions, degrees of crystallinity and orientation functions. Such manual calculations are tedious. Hence, a program was devised using the newly acquired IBM 1620 Computer.

MSUCP-10 $6.60

Michigan State U., East Lansing.
MISTIC EQUILIBRIUM ORBIT CODE, by T. I. Arnette. Rept. on Contract AT(11-1)-872. Sep 61, 63p.

MSUCP-7 $7.60

Michigan State U., East Lansing.
MISTIC GENERAL ORBIT CODE, by M. M. Gordon and H. G. Blosser. Rept. on Contract AT(11-1)-872. Sep 61, 71p.

MECHANICS

NYO-10247 $3.60

Rochester U., N. Y.
ON THE KINEMATICS OF THE RELATIVISTIC TWO-PARTICLE SYSTEM, by A. J. Macfarlane. Rept. on Contract AT(30-1)-875. 24 Sep 62, 38p. 14 refs.

Aerodynamics and Pneumatics

NASA N62-16681 $8.60

Geophysics Corp. of America, Bedford, Mass.
THE ONE-DIMENSIONAL TREATMENT OF THE ESCAPE OF A GAS INTO A VACUUM, by H. Moses. Rept. on Contract NAS5-215. Sep 62, 91p. 7 refs. GCA Technical rept. no. 62-10-N.

NASA N63-10246 $1.10

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
A METHOD FOR DETERMINING MODAL CHARACTERISTICS OF NONUNIFORM THIN CIRCULAR RINGS, by T. E. Lang and R. E. Reed. Rept. on Contract NAS7-100. 1 Oct 62, 3p. Technical rept. no. 32-252, addendum no. 1.

Hydrodynamics, Hydraulics, and Hydrostatics

NASA N63-10218 $1.10

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
AN APPROXIMATE FORM FOR THE FREE-SURFACE SHAPE OF A STATIC FLUID IN A CYLINDRICAL TANK OF LARGE RADIUS, by H. E. Williams. Rept. on Contract NAS7-100. 28 Sep 62, 10p. Technical rept. no. 32-344.

UCRL-6267 $8.60

Lawrence Radiation Lab., U. of California, Livermore.
NUMERICAL SOLUTION OF THE ONE-DIMENSIONAL LAGRANGIAN HYDRODYNAMIC EQUATIONS, by John G. Trulio and Kenneth R. Trigger. Rept. on Contract W-7405-eng-48. Jan 61, 97p. 4 refs.

METALLURGY

ARF-2198-31 $1.60

Armour Research Foundation, Chicago, Ill.
IMPROVED ZIRCONIUM ALLOYS, by D. Weinstein and F. C. Holtz. Quarterly rept. 1 Apr-30 June 62, on Contract AT(11-1)-578. 13 July 62, 15p.

HW-SA-2732 $1.10

Hanford Atomic Products Operation, Richland, Wash.
NEW METHODS FOR FABRICATION AND INSPECTION OF SILVER BRAZED AND SOFT SOLDERED JOINTS, by W. J. Pickering. Rept. on Contract AT(45-1)-1350. 23 Aug 62, 10p.

HW-SA-2112 $2.60

[Hanford Atomic Products Operation] Richland, Wash.
NUCLEAR WELDING AT HANFORD, by Thomas B. Correy. [Rept. on Contract AT(45-1)1350]. 24 Feb 61, 25p. 6 refs.

PB 162 360 $7.60

Illinois Inst. of Tech., Chicago.
THE MECHANISM OF BOUNDARY MIGRATION IN RECRYSTALLIZATION, by Paul Gordon and R. A. Vandermeer (Doctoral thesis). Technical rept. no. 3 on Contract DA 11-022-ORD-1984 and Technical rept. no. 8 on Contract Nonr-1406(03). Aug 61, 73p. 16 refs.

DESCRIPTORS: *Aluminum alloys, *Copper alloys, Alloys, Crystals, Crystallization, Lattices, Impurities, Deformation, Nucleation, Grains (Metallurgy), Phase transitions, Transformation.

On the basis of a unified concept, theoretical expressions for grain boundary migration in recrystallization are derived for impurity controlled and impurity-independent migration. Quantitative experimental data for boundary migration in the recrystallization of polycrystalline zone-refined aluminum and in binary "alloys" of this aluminum with 0.00021, 0.00043, 0.0017, 0.0034, 0.0068, 0.0124 and 0.0256 atomic percent copper, respectively, are presented.

IS-377 $2.60

Institute for Atomic Research, Iowa State U. of Science and Tech., Ames.
ION-EXCHANGE METHODS FOR OBTAINING PURE METALS, by J. E. Powell and F. H. Spedding. [1961] 29p. 69 refs.

LADC-5281 $5.60

Los Alamos Scientific Lab., N. Mex.
PLUTONIUM FOUNDRY PRACTICES AT LOS ALAMOS SCIENTIFIC LABORATORY, by J. W. Anderson and W. J. Maraman. [Rept. on Contract W7405-eng-36]. 21 Aug 62, 56p.

TID-16455 $9.10

Syracuse U. Research Inst., N. Y.
LOW CYCLE FATIGUE OF PRESSURE VESSEL MATERIALS, by Volker Weiss, John Sessler, and Paul Packman. Final technical rept. on Contract AT(30-1)-2141. June 62, 102p. 18 refs.
MET. E. 575-662-F.

Ferrous Metals

MSAR-61-29 $1.60

MSA Research Corp., Callery, Pa.
EFFECT OF 1200 F SODIUM ON AUSTENITIC AND FERRITIC STEELS. PART I. PHYSICAL PROPERTIES OF MATERIALS. PART II. THERMAL SHOCK. Progress rept. no. 6 on Contract AT(11-1)-765. 10 Mar 61, 18p.

MSAR-62-109 $2.60

MSA Research Corp., Callery, Pa.
EFFECT OF 1200 F SODIUM ON AUSTENITIC AND FERRITIC STEELS. PHYSICAL PROPERTIES OF MATERIALS. Progress rept. no. 24, Aug 62, on Contract AT(11-1)-765. 17 Sep 62, 24p.

Structural Metallurgy and Corrosion

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AN EVALUATION OF MATERIALS OF CONSTRUCTION FOR THE SULFLEX AND ZIRFLEX PROCESSES, by Herbert Katz and Robert Isler. Aug 62, 47p. 5 refs.

HW-SA-2333 $1.60

Hanford Atomic Products Operation, Richland, Wash.
EFFECT OF CYCLIC DECONTAMINATION ON CORROSION RATES, by Lyle D. Perrigo. Rept. on Contract AT(45-1)-1350. 25 July 62, 19p. 5 refs.

WCAP-1689(Rev.) $5.60

Westinghouse Electric Corp., Pittsburgh, Pa.
THE BEHAVIOR OF AUSTENITIC STAINLESS STEEL CORROSION PRODUCTS IN HIGH TEMPERATURE BORIC ACID SOLUTIONS, by W. D. Fletcher, A. Krieg and P. Cohen. Dec 60, rev. May 61. 49p. 12 refs.

NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

ARF-1207-6 $1.60

Armour Research Foundation, Chicago, Ill.
RESEARCH ON NEW METHODS OF PREPARING HIGH SPECIFIC ACTIVITY RADIOISOTOPES. Quarterly progress rept. no. 2, 1 June-31 Aug 62, on Contract AT(11-1)-578. [1962] 11p.

WAPD-TM-207 $0.50

Bettis Atomic Power Lab., Pittsburgh, Pa.
CLIP 1. AN IBM-704 PROGRAM TO SOLVE THE P-3 EQUATIONS IN CYLINDRICAL GEOMETRY, by B. Anderson, J. Davis and others. Rept. on Contract AT(11-1)-GEN-14. May 62, 19p. 6 refs. NASA N62-16034.

AD-279 290 $1.10

Gates and Crellin Labs. of Chemistry, Calif. Inst. of Tech., Pasadena.
NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY. γ , γ -DIMETHYLALLYLMAGNESIUM BROMIDE, by George M. Whitesides, J. Eric Nordlander, and John D. Roberts. Technical rept. no. 18 on Contract Nonr-220(26). Feb 62, 7p. 7 refs. Contribution no. 2822.

DESCRIPTORS: *Nuclear magnetic resonance, *Microwave spectroscopy, Molecular spectroscopy, Spectroscopy, *Magnesium compounds, *Bromides, Allyl radicals, Methyl radicals, *Grignard reagents, Reagents, Gamma rays, Protons.

HW-SA-1963 $1.60

Hanford Atomic Products Operation, Richland, Wash.
RECOVERY OF NEPTUNIUM IN SOLVENT EXTRACTION PROCESSES, by G. E. Benedict, T. R. McKenzie, and G. L. Richardson. Rept. on Contract AT(45-1)-1350. [1960] 16p.

NYO-10424 $3.60

Institute of Mathematical Sciences, New York, N. Y.
THEORETICAL ASPECTS OF CONTROLLED THERMONUCLEAR FUSION. Summaries of papers presented at the meeting held at New York University, 30 Apr-1 May 62. Rept. on Contract AT(30-1)-1480. 31 July 62, 33p. 15 refs. MF-32.

NASA N63-10247 $1.10

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
PHYSICAL INTERPRETATION OF THE EXTRA SOLUTIONS OF THE DIRAC EQUATION FOR STRONGLY COUPLED YUKAWA POTENTIALS, by P. B. Burt and W. K. R. Watson. Rept. on Contract NAS7-100. 10 Sep 62, 9p. 3 refs. Technical rept. no. 32-341.

NYO-2670 $8.60

Laboratory for Nuclear Science, Mass. Inst. of Tech., Cambridge.
THE TRAJECTORIES OF COSMIC RAYS IN A HIGH DEGREE SIMULATION OF THE GEOMAGNETIC FIELD, Aug 62, 85p. 10 refs. by K. G. McCracken, U. R. Rao, and M. A. Shea. Technical rept. no. 77.

UCRL-9568 $2.60

Lawrence Radiation Lab., U. of California, Berkeley.
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AN EXPERIMENTAL DETERMINATION OF THE SPIN EXCHANGE CROSS SECTIONS OF Rb^{85}, AND Cs^{133}, by Henry Warren Moos. Doctoral thesis. 1961, 118p. 49 refs.

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Michigan U., Ann Arbor.
NEUTRON-CAPTURE GAMMA RAYS, by P. A. Treado and P. R. Chagnon. Rept. on Contract AT(11-1)-1112. [1962], 10p. 4 refs.

NUMEC-P-44 $1.10

Nuclear Materials and Equipment Corp., Apollo, Pa.
DEVELOPMENT OF PLUTONIUM-BEARING FUEL MATERIALS, by Karl H. Puechl. Monthly progress letter for July 62, on Contract AT(30-1)-2389. 5 Aug 62, 4p.

PNE-103F $1.00

Oak Ridge National Lab., Tenn.
THE SEQUENCED GAS SAMPLING EXPERIMENT, by J. W. Landry. Rept. on Proj. GNOME, Contract W7405-eng-26. Aug 62, Issued 26 Sep 62. 35p. 25 refs. NASA N62-16879.

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Union Carbide Nuclear Co., Tuxedo, N. Y.
RESEARCH IN ACTIVATION ANALYSIS, by Henry H. Kramer, Victor J. Molinski and others. Quarterly progress rept. no. 1, 23 Apr-31 Aug 62, on Contract AT(30-1)-2975. 19 Sep 62, 14p. 6 refs.

Instruments and Installations

ARF-1192-6 $0.75

Armour Research Foundation, Chicago Ill.
A STUDY OF THE FEASIBILITY OF USING SCINTILLATING FIBERS FOR LOW ENERGY BETA COUNTING by C. Preston, Rept, on Contract AT(11-1)-578. 23 Feb 62, 30p. 10 refs. NASA N62-15985.

BNL-6287 $9.10

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RECENT ADVANCES IN THE BUBBLE CHAMBER TECHNIQUE, by R. P. Shutt. 10 Sep 62, 111p. 24 refs.

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EXPERIENCE WITH THE IONIZATION CHAMBER PULSE READER AT HANFORD, by F. L. Rising. [Rept. on Contract AT(45-1)1350]. June 61, 17p.

HW-SA-2590 $1.60

Hanford [Atomic Products Operation] Richland, Wash.
EXPERIMENTAL PERSONNEL RADIATION DOSIMETERS, by D. P. Brown and M. O. Rankin. [Rept. on Contract AT(45-1)1350]. 21 May 62, 13p. 2 refs.

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IONIZATION CHAMBER AIR SAMPLING SYSTEM FOR TRITIUM, by G. A. Little. [Rept. on Contract AT(45-1)1350]. 17 May 62, 11p. 5 refs.

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HW-SA-2637 $1.60

Hanford Atomic Products Operation, Richland, Wash.
A SIMPLE PULSE SHAPE DISCRIMINATOR FOR FAST TIME-OF-FLIGHT SERVICE, by J. T. Russell and D. G. Foster. [Rept. on Contract AT(45-1)1350]. 7 Aug 62, 13p.

UCRL-9513 $4.60

Lawrence Radiation Lab., U. of California, Berkeley.
ENERGY RESPONSE AND PHYSICAL PROPERTIES OF NTA PERSONNEL NEUTRON DOSIMETER NUCLEAR TRACK FILM, by Richard L. Lehman. Rept. on Contract W-7405-eng-48. 13 Jan 61, 41p. 12 refs.

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Oak Ridge National Lab., Tenn.
NEUTRON FLUX AND TISSUE DOSE STUDIES WITH FISSION THRESHOLD DETECTORS. PART I. EXPERIMENTAL MEASUREMENTS, by G. S. Hurst, J. A. Harter and others. Rept. on Contract W7405-eng-26. 30 Mar 54, declassified 13 Mar 62. 24p. 13 refs.

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A FAST NEUTRON TIME OF FLIGHT SYSTEM FOR USE WITH CYCLOTRONS, by H. W. Fulbright, J. W. Verba and others. Rept. on Contract AT(30-1)-875. 16 Aug 62, 34p. 3 refs.

DP-753 $0.50

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Nuclear Engineering and Power

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CALCULATIONS OF THE DOPPLER COEFFICIENT OF LARGE CERAMIC-FUELED FAST REACTORS, by M. G. Bhide and H. H. Hummel. Rept. on Contract W-31-109-eng-38. Aug 62, 23p. 7 refs.

ARF-4267-2 $2.60

Armour Research Foundation, Chicago, Ill.
STUDIES OF REACTOR CONTAINMENT. Bi-monthly progress rept. July-Aug 62, on Contract AT(11-1)-578. [1962] 24p.

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IRRADIATION BEHAVIOR OF AUSTENITIC STAINLESS STEEL BURNABLE POISONS, by R. G. Gray, W. Yeniscavich, and L. R. Lynam. Rept. on Contract AT(11-1)-GEN-14. Aug 62, 27p. 11 refs. NASA N62-15731.

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PRESSURIZED WATER REACTOR (PWR) PROJECT. Technical progress rept. for 24 June-23 Aug 62, on Contract AT(11-1)-GEN-14. [1962] 125p.

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THE SECOND REFUELING OF CORE 1 OF THE SHIPPINGPORT ATOMIC POWER STATION, by C. E. Center, H. Feinroth, and J. E. Yingling. Rept. on Contract AT(11-1)-GEN-14. Aug 62, 120p.

BNL-5366 $1.60

Brookhaven National Lab., Upton, N. Y.
THE USE OF LITHIUM-6 DEUTERIDE AS A SOURCE OF 14-MEV NEUTRONS IN A NUCLEAR REACTOR, by Allen J. Weiss, Walter D. Tucker, and Louis G. Stang, Jr. Mar 61, 20p. 9 refs.

TID-7634 $2.75

Chicago Operations Office, Atomic Energy Commission Ill.
PROCEEDINGS OF THE NUCLEAR SUPERHEAT MEETING, NO. 6, MARCH 7, 8, AND 9, 1962, WINDSOR, CONNECTICUT, by Andrew E. Mravca. 30 Mar 62, 146p. COO-265. 131 refs.

NYO-10471 $4.60

David Sarnoff Research Center, Princeton, N. J.
DEVELOPMENT OF HIGH SPEED ELECTRON ACCELERATOR STRUCTURES. Final rept. 1 Nov 60-30 June 62, on Contract AT(30-1)-1958. [1962] 43p. 3 refs.

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Duquesne Light Co., Shippingport, Pa.
MONTHLY OPERATING REPORT. Rept for Sep 62, on Contract AT(11-1)-292. 24 Oct 62, 45p.

DLCS-1650102 $4.60

Duquesne Light Co., Shippingport, Pa.
STEADY STATE LOAD TESTS. 26 May 61, 48p. T-554927.

GA-1972 $1.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
REFUELING GAS-COOLED REACTORS, by S. L. Koutz and J. Foster. Rept. on Contracts AT(04-3)-314 and AT(10-D)-925. 6 Mar 61, 13p.

GAMD-1652 $5.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
THERMAL DESIGN OF THE MGCR CORE BARREL STRUCTURE, by J. T. Rogers and R. Katz. Rept. on Contract AT(04-3)-187. 11 Oct 60, 53p. 10 refs. MGCR-RE-277.

GEMP-130 $9.60

General Electric Co., Cincinnati, Ohio.
630A MARITIME NUCLEAR STEAM GENERATOR. Progress rept. no. 1, Apr-30 June 62, on Contract AT(40-1)-2847. 31 July 62, 111p.

GEMP-74 $1.25

General Electric Co., Cincinnati, Ohio.
REACTOR INSTRUMENTATION AND CONTROL. Progress rept. no. 74, on Contract AT(40-1)-2847. 28 Sep 62, 46p. 10 refs. NASA N62-16339.

GEAP-3135(Vol. II) $10.50

General Electric Co., San Jose, Calif.
THE RHODE ISLAND AND PROVIDENCE PLANTATIONS ATOMIC ENERGY COMMISSION NUCLEAR SCIENCE CENTER. VOLUME II: SAFEGUARD REPORT. 20 May 59, 122p.

GNEC-212 $5.50

General Nuclear Engineering Corp., Dunedin, Fla.
A 200-Mw(e) DIRECT CYCLE BOILING WATER REACTOR WITH INTEGRAL NUCLEAR SUPERHEAT. REFERENCE DESIGN WITH DOUBLE-ANNULAR BOILING-SUPERHEATING FUEL ELEMENTS. Rept. on Contract AT(11-1)795. 29 Jan 62, 452p. 15 refs. Prepared in cooperation with Combustion Engineering, Inc.

HW-74622 $1.60

Hanford Atomic Products Operation, Richland, Wash. COMBINED EFFECTS OF STRESS AND IRRADIATION ON STRUCTURAL MATERIALS. (DEFINITION AND APPROACH), by K. R. Merckx and J. C. Tobin. Rept. on Contract AT(45-1)-1350. 14 Aug 62, 17p. 21 refs.

HW-SA-2000 $2.60

Hanford Atomic Products Operation, Richland, Wash. CONTAMINATION CONTROL AT THE HANFORD REACTORS, by S. L. Nelson. [Rept. on Contract AT(45-1) 1350]. [1961] 28p. 8 refs.

HW-51842 $9.10

Hanford Atomic Products Operation, Richland, Wash. DESIGN CRITERIA FOR PLUTONIUM FABRICATION PILOT PLANT PROJECT CG-747, Rept. on Contract AT(45-1)-1350. 5 Sep 57, 106p.

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LASL CONTROLLED THERMONUCLEAR RESEARCH PROGRAM. Quarterly status rept. for period ending 20 Aug 62, on Contract W-7405-eng-36. 2 Oct 62, 20p. 3 refs. NASA N62-16538.

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HW-SA-2500 $3.60

Hanford Atomic Products Operation, Richland, Wash.
IRRADIATION EFFECTS IN URANIUM DIOXIDE SINGLE CRYSTALS, by J. L. Bates, J. A. Christensen, J. L. Daniel. [Rept. on Contract AT(45-1)1350]. 14 June 62, 31p. 11 refs.

TID-16879 $5.60

Illinois U., Urbana.
MEASUREMENT OF EQUILIBRIUM CONCENTRATIONS OF VACANCIES IN COPPER, by R. O. Simmons and R. W. Balluffi. Technical rept. no. 34 on Contract AT(11-1)-182. Sep 62, 53p. 54 refs.

IS-181 $2.60

Institute for Atomic Research, Iowa State U. of Science and Tech., Ames.
THE CRYSTAL STRUCTURE OF $LiCuCl_3 \cdot 2H_2O$, by Peter H. Vossos, D. R. Fitzwater, and R. E. Rundle. [1959] 24p.

UCRL-10386 $0.75

[Lawrence Radiation Lab., U. of California, Berkeley.
A CRYSTALLOGRAPHIC STUDY OF MAGNESIUM AMMONIUM SULFATE HEXAHYDRATE, by Thomas N Margulis. Doctoral thesis. Rept. on Contract W-7405-eng-48. July 62, 29p. 8 refs.

UCRL-10354 $1.00

Lawrence Radiation Lab., U. of California, Berkeley.
FACTORS AFFECTING THE DISLOCATION SUBSTRUCTURE IN DEFORMED MAGNESIUM OXIDE, by Walter E. Elkington. Master's thesis. Rept. on Contract W-7405-eng-48. July 62, 43p. 8 refs.

ORO-573 $1.60

Virginia U., Charlottesville.
HEXAGONAL NETWORKS OF LINEAR IMPERFECTIONS IN SINGLE CRYSTALS OF CADMIUM, by J. C. Crump III and J. W. Mitchell. Rept. on Contract AT(40-1)-2488. 9 Aug 62, 12p. 3 refs.

Thermodynamics

TID-16704 $1.10

Argonne National Lab., Ill.
THE SPECIFIC HEAT OF SIX RARE EARTH METALS BETWEEN 0.4 AND 4°K, by O. V. Lounasmaa. [Rept. on Contract W31-109-eng-38]. June 62, 8p. 14 refs.

TID-14393 $2.60

California U., Los Angeles.
GROWTH OF A VAPOR-FILLED CAVITY NEAR A HEATING SURFACE AND SOME RELATED QUESTIONS, by Kurt Forster. Progress rept. no. 8, on Contract AT(11-1)-34. Aug 60, 26p. 18 refs. Rept. no. 60-76.

NASA N63-10332 $3.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
HEAT AND MOMENTUM TRANSFER IN SMOOTH AND ROUGH TUBES AT VARIOUS PRANDTL NUMBERS, by Duane F. Dipprey and Rolf H. Sabersky. Rept. on Contract NAS7-100. 6 June 62, 37p. 17 refs. Technical rept. no. 32-269.

UCRL-6815 $2.50

Lawrence Radiation Lab., U. of California, Livermore.
OPERATOR'S MANUAL FOR RUBY, by Howard B. Levine and Robert E. Sharples. Rept. on Contract W-7405-eng-48. 20 Mar 62, 126p. 2 refs.
NASA N62-16450.

LADC-5176 $3.60

Los Alamos Scientific Lab., N. Mex.
SOME THERMODYNAMIC PROPERTIES OF THE ACTINIDE CARBIDES, INCLUDING NEW MEASUREMENTS OF THE HEATS OF FORMATION OF SOME THORIUM, URANIUM AND PLUTONIUM CARBIDES, by Elmer J. Huber, Jr., and Charles E. Holley, Jr. [Rept. on Contract W7405-eng-36]. 22 Aug 62, 33p. 43 refs.

ORNL-1956 $3.60

Oak Ridge National Lab., Tenn.
ENTHALPIES AND HEAT CAPACITIES OF SOLID AND MOLTEN FLUORIDE MIXTURES, by W. D. Power and G. C. Blalock. [Rept. on Contract W7405-eng-26]. Declassified 10 Apr 62. 29p. 11 refs.

ORNL-2278 $4.60

Oak Ridge National Lab., Tenn.
VISCOSITY MEASUREMENTS ON MOLTEN FLUORIDE MIXTURES, by S. I. Cohen and T. N. Jones. Rept. on Contract W-7405-eng-26. 12 July 57, declassified 10 Apr 62, 49p. 37 refs.

RESEARCH METHODS, TECHNIQUES AND EQUIPMENT

NASA N62-16463 $9.10

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
RESEARCH SUMMARY NO. 36-9, VOLUME I. Rept. for 1 Apr-1 June 61 on Contract NASw-6. 1 July 61, 104p. 106 refs.

NASA N62-17436 $12.00

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SPACE PROGRAMS SUMMARY NO. 37-16, VOLUME IV. SUPPORTING RESEARCH AND ADVANCED DEVELOPMENT. Rept. for 1 June-1 Aug 62, on Contract NAS7-100. 31 Aug 62, 170p.

UCRL-6814 $1.60

Lawrence Radiation Lab., U. of California, Livermore.
APPLICATIONS OF 5- AND 10-NANOSECOND SHUTTERS TO NONLUMINOUS PHENOMENA, by David C. Oakley and Joseph R. Hearst. Rept. on Contract W-7405-eng-48. 29 July 62, 19p. 5 refs.

AD-265 575 $11.50

Winzen Research, Inc., Minneapolis, Minn.
STRATO LAB HIGH #4 POST FLIGHT REPORT. Rept. on Contract Nonr-1460(09). 23 Aug 61, 157 p. 1 ref. Rept. no. 1262-R; NASA N62-11204.

DESCRIPTORS: *Balloons, Scientific research, *Astronomy, Flight testing, Design, Tests, Stability, Balloon gondolas, Electrical equipment, Radio equipment, Radio communication systems, *Closed-cycle ecological systems, Air conditioning equipment, Effectiveness, Laboratories, Airborne

The STRATO-LAB HIGH #4 manned balloon flight demonstrated a capability for using a manned balloon-borne observatory for conducting astronomical research above the bulk of Earth's atmosphere. Another of the accomplishments of this flight was its setting a record for the heaviest load ever flown on a manned stratosphere flight using a plastic balloon. A gross inflation of 5567 pounds was used to lift the payload of 3897 pounds to its ceiling altitude. The STRATO-LAB gondola, which has been used for all of the sealed cabin stratosphere ascents under this program to date, was severely damaged after landing. This was the result of its being dragged for nearly one-third mile by high surface winds which had billowed its safety parachute.

SOCIAL SCIENCES

TID-5001 (4th rev.) $4.50

Atomic Energy Commission. Div. of Technical Information Extension, Oak Ridge, Tenn.
SUBJECT HEADINGS USED BY THE U. S. A. E. C. DIVISION OF TECHNICAL INFORMATION, by Charles W. Hargrave. Aug 62, 378p.

PB 162 566 $5.60

Bureau of Social Science Research, Inc., Washington, D. C.
A SURVEY OF USERS OF THE AMERICAN SOCIETY FOR METALS--WESTERN RESERVE UNIVERSITY SEARCHING SERVICE, by Ivor Wayne. Rept. on Contract NSF-C257. July 62, 59p. 3 refs. Rept. no. BSSR:352.

DESCRIPTORS: *Documentation, *Information retrieval, Effectiveness, Public opinion, Costs, Abstracts.

Contents:
How the survey was conducted
The respondents, their characteristics and their general opinions of the service
What performance characteristics respondents considered important
Respondents' opinions of specific performance characteristics of the service
Scope, coverage, exhaustiveness
The problem of coverage of peripheral areas
Speed of the service
System characteristics of intermediate importance to users
System characteristics of minor importance
What they thought of the price
Intentions of future use of the service

MISCELLANEOUS

PB 181 409 $1.25, $10.00/year

Naval Research Lab., Washington, D. C.
REPORT OF NRL PROGRESS. Nov 62.

DESCRIPTORS: *Naval research, *Scientific research, Solar cells, Protons, Spaceship cabins, Spacecraft cabins, Atmospheric pollution, Chemistry, Insect repellents, Isoptera, Sebacic acid, Firefighting vehicles, Electricity, Inverters, Mechanics, Shock (Mechanics), Vibration, Thermoelectricity, Metallurgy, Ceramics, Titanium alloys, Niobium, Nickel, Magnesium alloys, Superconductivity, Corrosion inhibition, Steel, Submarine hulls, Cathodic protection, Radio, Digital-to-analog converters, Electron multipliers, Storage tubes, Transmission lines, Magneto-optic effect, Spectra (Infrared), Halides, Solid state physics, Cesium compounds, Fluorides, Fluorescent screens, Sound, Ship structural components, Hoists, Acoustics, Scattering, Scientific reports, Patents.

Contents:
Articles:
Proton Damage to Silicon Solar Cells, by J. F. Weller
Atmospheric Contamination in the Space Cabin, by R. A. Saunders
Scientific Program:
Chemistry: Field evaluation of nine termite repellents and three wood-modifying agents.... Synthesis of ω-halohexadecanoic acids.... Development of a combination runway foaming-tanker vehicle for augmenting naval air station fire-fighting operations
Electricity: Three-phase static inverter with waveform synthesis.... Brief survey of elementary thermoelectric theory
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Metallurgy and Ceramics: Ductile rupture dimple size related to Charpy-V energy in two titanium alloys.... Effect of interstitial contaminants on the high-temperature mechanical properties of niobium.... Modification of the surface-tracer technique for the measurement of small radiation-produced diffusion coefficients.... Creep rupture of two purities of nickel in controlled environments.... Effect of thermally activated Brillouin zone overlap on the lattice spacing of magnesium alloys.... Measurements of dynamic effects arising from high-speed solidification of metals....

Hall coefficient of superconducting and normal Nb-25%Zr alloy.... Oxidation resistant coatings for niobium alloys.... Comparison of the effects of simultaneous irradiation of five steels exposed at 240°F.... Factors that determine the applicability of high-strength quenched and tempered steels to submarine hull construction.... Performance of lead-silver impressed current anodes for the cathodic protection of reserve fleet ships

Radio: Diode digital-to-analog conversion technique.... Evaluation of the secondary emitter surfaces of electron multiplier tubes.... Wide dynamic range multiple playback storage tube.... Ferrite-loaded open transmission line

Solid State Physics: Magneto-optical oscillations in the free carrier and interband absorption of semiconductors.... Infrared lattic vibration spectra of alkali halides.... Search for the F-band in irradiated cesium fluoride.... Ultraviolet bands in x-rayed alkali halides.... Removal of haloes in multicolor transparent luminescent screens

Sound: A capstan for deep-sea hoists.... Theoretical model of a rough boundary as a blackscatterer of acoustic radiation

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